Past connections and present similarities in slave ownership and fossil fuel usage

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Abstract The first part of the paper demonstrates the connection between the abolition of slavery and the Industrial Revolution: steam power changed the perception of labour; new techniques facilitated diffusion of pro-abolition pamphlets; fewer threats to basic existence resulting from industrial advances fostered sensibilities and moral standards toward abolitionism; and, through industrial development, the North grasped victory in the American Civil War. The second part presents similarities between societies in the past that have used slave labour and those in the present that use fossil fuels. It argues that slaves and fossil-fuelled machines play(ed) similar economic and social roles: both slave societies and developed countries externalise(d) labour and both slaves and modern machines free(d) their owners from daily chores. Consequently, we are as dependent on fossil fuels as slave societies were dependent on bonded labour. It also suggests that, in differing ways, suffering resulting (directly) from slavery and (indirectly) from the excessive burning of fossil fuels are now morally comparable. When we emit carbon dioxide at a rate that exceeds what the ecosystem can absorb, when we deplete non-renewable resources, we indirectly cause suffering to other human beings. Similarly, cheap oil facilitates imports of goods from countries with little social protection and hence help externalise oppression. The conclusion draws on the lessons which may be learned by Climate Change campaigners from the campaigns to abolish slavery: environmental apathy can be opposed effectively if we learn from what worked in the fight against this inhuman institution.

1 Introduction: nothing new under the sun

In her travel book *Domestic Manners of the Americans* (1832) Frances Trollope remarked that Southern American slave owners were fully aware of the inequalities

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amongst social classes in England. They constantly "inveigh against the governments of Europe", she wrote, "because, as they say, they favor the powerful and oppress the weak. (...) Listen to [them], and then look at them at home; you will see them with one hand hoisting the cap of liberty and with the other flogging their slaves" (quoted in Davis 2006: 177). This attitude of Southerners was reported by many observers. Conversely, in Britain, many who vehemently opposed slavery in America often failed to say anything about the appalling social inequalities in their own country. These antagonistic, yet strangely parallel, mindsets perfectly illustrate our human tendency to see minor shortcomings in other peoples without noticing our own major weaknesses.

Slavery is often approached with a similar outlook, based on the underlying positivist assumption that modern civilisation is morally superior to the barbaric slave-owning societies of the past. Yet, before jumping too quickly to this conclusion, we should pause for a moment and reflect on the similarities in our current attitudes towards fossil fuels and climate change and the behaviour of slave owners. This article aims to do just this in two parts. First it examines the role of the Industrial Revolution in eradicating slavery and in triggering our large-scale burning of coal and, later, oil and gas. Second, it suggests that, even though today's societies look very different from slave societies, by replacing the institution of slavery and the social structures that supported it with a new set of structures built on fossil fuels, modern societies have, in many ways, become similar to their problematic predecessors (this phenomenon is not limited to Western societies). For instance, since we now know the consequences of climate change in some parts of the world, we have to acknowledge that carbon dioxide emissions produce affliction, certainly not in a direct way like slavery, but nonetheless a very real affliction for those who suffer from it. There are also many similarities between the way in which fossil fuels are used today and the way in which slave labour was used in the past. So evident is this correlation that it is now fairly common for authors to refer to "energy slaves" to designate the services provided to us by machines: in the 1990s the average global citizen "deployed about 20 'energy slaves' meaning 20 human equivalents working 24 hours a day, 365 days a year", recently wrote McNeill (2000: 15). Hence, the second section argues that we now behave much like slaveholders.

This claim certainly will appear outrageous to many. However, the purpose of this article is not to blame or alienate any specific individuals or groups of people. Quite the contrary: at a time when society is searching for culprits responsible for the environmental troubles lying ahead of us, I argue that we have arrived at the present situation (mostly) in good faith, with the conviction that modernity would bring the masses freedom from toil, and without any chance of knowing the climatic consequences of our burning of fossil fuels. By placing matters in context, history enables us to move away from over-simplistic moral judgment and offers a better understanding of the motives of those who introduced fossil-fuel powered engines— and, unwittingly, left us trapped in a new form of dependency. True, this article also establishes similarities between our society's behaviour and slave owning societies of past centuries, and therefore does morally condemn our behaviour. Yet it does so by emphasizing the near universality of the institution of slavery or neo-slavery in human societies, and thus blames 'human nature' as a whole for the problem. This does not diminish our moral responsibility, but at least it should prevent us from

transforming too easily 'others' into scapegoats, another universal human tendency (Girard 1987).

2 Impacts of the industrial revolution on the abolition of slavery

For at least 60 years, historians have been debating the role of slavery and the plantation economy in galvanising the Industrial Revolution in Britain; whilst some historians have argued that slavery was a necessary pre-condition for industrialisation (Williams 1944), others have vehemently disagreed (O'Brien 1982; Pétré-Grenouilleau 2004). More recent scholarship, however, seems to endorse the view that slave traders and owners, and plantations in general, played an indirect, but not negligible, role in the establishment of the industrialist and capitalist system in Britain (Morgan 2000; Inikori 2002; Pomeranz 2000). (An earlier draft of this article contained a section that discussed in some detail how slavery helped spur on industrialisation by channelling the demand for goods, and by boosting the economy and food production. It was reluctantly swept aside to shorten what is arguably still, a somewhat lengthy article).

The relation between industrialisation and slavery does not stop there. Paradoxically, there are also important links between industrialisation and the *demise* of slavery. At a superficial level, a striking correlation in time and place indeed exists between the rise of anti-slavery movements and the appearance of steam machines. It was at the time that the abolitionist movement started in the 1780s that Watt's engines were applied to power machines (steam engines were previously mostly used for pumping water out of mines). The abolition of serfdom in Russia also coincided with the arrival of steam power in Russian society. Was this merely coincidental?

The simultaneous rise of the steam engines and of the abolitionist movement was certainly not accidental. Industrialisation triggered a change in the perception of labour in Britain, which came to be seen more positively. Slavery has also often been portrayed as the easiest solution to long-standing energy shortages in pre-industrial societies, and the improvement in technology diminished the pressure to own bonded labourers. Even though steam power in the nineteenth century did not directly replace slaves on a large scale, it might have favoured the emancipation of slaves in an indirect way. It provided a paradigm shift, when people of all social classes came to imagine a future where manual work (and, ultimately, slavery) would be rendered unnecessary by machines. A scientist summarized the revolution of the mind brought about by new power in the early 1820s:

> The importance of [steam engines] is immense, and their use is increasing daily. They seem destined to bring about a great revolution in the civilised world. The heat engine is already at work in the exploitation of our mines, for driving our ships, digging out our ports and rivers, forging steel, fashioning wood, milling grain, spinning and weaving cloth, transporting the heaviest loads. It seems that one day it must become a universal source of power and in this respect supplant animals, water and wind (Carnot 1824).

The belief in progress, fuelled by the development in machinery and the psychological revolution it induced, is fundamental for understanding the anti-slavery

movement in Britain and the United States. The Industrial Revolution also triggered
vast changes in people's way of life. People were better and more regularly fed and
the improving economic conditions freed up many to pursue 'higher' forms of activity
beyond simple subsistence. This increasing absence of threats to basic existence
helped alter sensibilities and moral standards over the suffering of slaves. These
material and intellectual changes were more important in the abolition of slavery
than is currently recognized.

2.1 A few caveats

First, however, it seems sensible to clarify a couple of points to avoid any potential
misunderstandings:

(a) I am *not* arguing that machines directly took the place of slaves in the nine-
     teenth centuries. Places where steam power stimulated the Industrial Revolu-
     tion were not the same places where slavery was important to the economy.
     Furthermore, machines were not yet advanced enough at the time to replace
     the work done by slaves.
(b) With a few exceptions, the steam-powered engines introduced in slave
     economies did not reduce the need for slaves. The fact that an innovation is
     labour-saving does not mean that its adoption will reduce overall demand for
     labour. This is because demand for goods and consumption often increases
     faster than production. This seeming contradiction is in fact a well-known
     paradox: the 'rebound effect', which states that when an appliance costs less
     to run, people tend to use it more.
(c) The effects of the steam engine were not unidirectional: steam power also
     helped *extend* and *prolong* slavery. For example, steam-powered sugar mills
     greatly enhanced slave productivity in Cuba, making the abolition of slavery
     more difficult locally. Similarly, slavery had been in decline in the American
     South until the mass use of textile mills in Britain (permitted by steam power)
     facilitated the expansion of the cotton market.
(d) I do not claim either that the *main* drive of the abolitionist movement was
     the idea that slaves could be superseded by machines, or that advocates of
     the abolition of slavery, based their arguments on the greater efficiency of
     mechanised tools and steam power. In fact abolitionists do not seem to have
     used this argument: a rapid verification through various debates on slavery at
     the time of abolition confirmed that impression (research in CDD 1774–1875
     and SDR 1806). Davis (Personal email communication) suggests a reason for
     this: "One of the key reasons Lincoln opposed slavery was his fear that in the
     West slaves would replace free white workers. He was above all concerned with
     the dignity and upward mobility of such Americans, which was also threatened
     by machines and 'technological unemployment'. Yet I suspect this was one
     of the major reasons abolitionists gave so little attention to machines as an
     alternative to slavery". However, the position of abolitionists on this issue
     needs to be re-assessed and set in a slightly different frame. It was widely
     accepted by people across all social classes—at least from the beginning of
     the nineteenth century—that machines were already, and would increasingly,

supersede human labour. This idea was constantly at the back of people's minds and so did play a role in the anti-slavery movement.

(e) In the past, the connection made between steam-powered machines and slavery was often in direct contradiction to the argument presented below, such that, far from potentially liberating slaves, machines were condemned for "enslaving" the proletariat. This seems especially evident in Britain, after 1830, a time when workers often felt that they were treated like machines. Engels repeatedly argued that the working classes "are worse slaves than the Negroes in America" (Engels 1845). However, making steam the equivalent of a slave-owner does not contradict my argument. In fact, the pervasiveness of references to slavery could very well have contributed to reinforcing a sense of solidarity between Britons who felt threatened by this new form of enslavement and 'real' slaves.

(f) Finally, one might also reverse my argument completely by suggesting that the main drive to mechanizing production was the result of the abolition of slavery, and, in this sense, that slavery impeded industrialisation. The abolition of the slave-trade and threats to the supply of slave labour indeed probably contributed to technical improvements. But this objection again does not invalidate my argument: it only further shows how these questions are interconnected.

2.2 Long-established arguments suggesting a link between the rise of industrialisation and the demise of slavery

Historians point to a variety of causes for the rise and maturation of the anti-slavery movement. The reasons advanced range from religious radicalism, the consequences of the American Revolution, the rise of various philanthropic movements and the spread of the Enlightenment, to economic reasons including the birth of modern capitalism, slave revolts or free labour ideology; and all these reasons undoubtedly played a role.

Links with the Industrial Revolution have also long been proposed. Davis specifically suggests that machines changed the perception of labour in Britain and led to a desire to dignify it. Until the end of the early modern world, labour had mostly been seen as a curse. Yet, at the time of the agricultural revolution (itself facilitated by industrialisation), bread was more easily and abundantly available. Simultaneously, thanks again to some extent to the introduction of steam and water power, labour in factories became less physically demanding (Smil 1995). These effects, combined with the powerful image of awe and progress steam conveyed, can explain why the image of labour changed. "It was not until writers in the Enlightenment and early nineteenth century began to ennoble free labour (...) that it became possible to launch a popular attack on slavery as a backward and inhuman institution that stigmatized and dishonoured the very essence of labour" (Davis 2006: 56; 286). While coerced labour was still widely accepted or even promoted in Britain in the eighteenth century, owners of capital and manufactures became increasingly convinced that giving wages to labourers offered many advantages. These labourers could indeed become consumers of manufactured products and hence contribute to the overall economic growth. This explains why anti-slavery became such a popular cause in the United Kingdom, a cause that could unite industrialists and working class people into signing the same petitions.

2.3 Slavery: a 'normal institution' challenged by a revolution of the mind

There are, however, more direct links between the advance of steam-power and the collapse of slavery in the world. If scholars studying slavery rarely make a direct connection between the two phenomena, historians of energy do associate them, at least implicitly. For them, slavery was the easiest solution to the long-standing energy shortage of pre-fossil fuel societies, except in favoured locations where draft animals or wind or water power were abundant. Bonded labour was a 'normal' feature of complex societies from the Sumerians onward. Slavery in the Americas was merely the climax of this long history (McNeill 2000: 11–12; Crosby 2006). These narratives, describing the succession of different energy regimes, from societies relying on plants, animals, wind or water power to the modern energy system based primarily on fossil fuels, imply that slavery has been superseded by modern technology.

According to this logic, if manpower shortages were to disappear from a given society, this society would not need slaves anymore. The idea that auto-animated machines could replace the work of slaves can be traced back to Aristotle: "we can imagine a situation", he wrote, "in which each instrument could do its own work (...). A shuttle would then weave of itself (...). In this situation (...) masters would not need slaves" (Barker 1998).

There are cases in history where new instruments were introduced that could do their own work. The introduction of technologies such as water-mills is indeed thought to have contributed to the diminution of the number of slaves in Europe after the twelfth century (Pétré-Grenouilleau 2008: 95). Or perhaps it was the contrary? "It was only when slave labour grew scarce that the water-mill was adopted throughout Western Europe" (Cipolla 1978: 50). It has long been argued that the availability of slave labour in places such as Rome impeded technological progress as "the social incentive to develop machines powered by other sources of energy than humans was weak or non-existent". The availability of slaves certainly played a role in inducing inertia in Roman (and other) societies (Debeir et al. 1991: 38–39; Bloch 1935). This is a classical example of a 'chicken and egg' problem; when labour scarcity appears somewhere, it results in a push for the invention of labour-saving devices, and vice-versa. This was well understood at the time of the abolition movement in Britain: it was recognized that the improvement of the steam-engine resulted directly from the fact that "the demand for labour was greater than the supply" (McDonnell 1825).

However, broadly speaking, machines did not replace slaves in the nineteenth century. In Britain, by 1700, coal already represented around 50% of the energy consumed (Warde 2007). In America, by contrast, steam power developed more slowly. Muscle and water provided most of the energy up to about 1800; steam engines were exceptional before then and remained rare for some time afterwards. In 1840, water wheels still provided far more energy than steam, and wood more heat than coal (Nye 1999). Thus, it is interesting to note that a mass anti-slavery movement began first in the country which started to use coal on a massive scale for motive power, i.e. the United Kingdom, and later moved on to the United States at the same time as coal use was significantly rising.

Yet, what matters for the understanding of the Abolition movement, is whether or not people *thought* that machines could ultimately replace human labour. On this account, there is no doubt that this idea was widespread. In 1832 John Quincy Adams, a former United States president and the future defendant of the self-

emancipated slaves in the *Amistad* case, reported to the Congress that in Great Britain "such was the multiplication of physical power by the agency of machinery, that [in 1815] the mechanical inventions in use were estimated as equivalent to the manual labor of two hundred millions of people" (Adams 1832).

Yet, these ideas were not only limited to the European and American elite: they were also widespread amongst the more modest segments of the population. From the beginning of the nineteenth century, if not before, most working-men and women were convinced that machines were increasingly superseding the need for human labour (Berg 1979; Jennings 1995). In the case of artisans and craftsmen, this change was not necessarily to their advantage. For example, Luddites (textile artisans who rioted against the introduction of new machinery in Britain) believed that labour-saving technologies triggered unemployment by reducing demand for labour.

It is one thing to believe that machines were doing the work of a large number of people, but it is arguably a different one to claim that they could replace the work of slaves. Neither Carnot nor Adams makes specific reference to bonded labourers, even though their use of the words 'animal power' or 'people' could certainly encompass them. The connection was, however, also made more directly. A few industrialists perceived that steam power might ultimately reduce the need for slaves. Manufacturers who opposed slavery on moral grounds supplied steam engines to the sugar plantations in the West Indies in order to reduce the need for slave labour (an engine required fewer people to manage it than an animal-powered mill for the purposes of crushing cane). Coal-fired engines did indeed replace the work of a limited number of slaves; observers claimed that in some of Britain's colonies the practice of night work by slaves "has been almost wholly abandoned (in consequence partly of the introduction of steam-engines)" (Yates 1824; Innes 1840). At least one activist, who was in contact with William Wilberforce, explicitly linked machines and the anti-slavery movement in a letter of 1789. He proposed a subscription scheme to buy steam engines to replace slaves (BAH 1785–1795; Tann 1997). Another Briton, Robert D. Owen, who supposedly had some influence with President Lincoln prior to the Emancipation Proclamation of 1863, also clearly equates steam-powered machines to slaves, and their owners as masters: "Great Britain may be said to have imported, from the vast regions of invention, two hundred millions of powerful and passive slaves" (Owen 1851).

Shortly after the Emancipation Proclamation, several contemporaries continued to draw the same parallel. In the 1870s an Arab slave trader reportedly said that "slave labour is to the interior of Africa what steam is to [the United Kingdom]" (Lugard 1965). Marx approved socialists who advocated that "the exploitation of man by man" be replaced by "the exploitation of nature by man" (McNeill 2000: 332). Oscar Wilde summarized widespread contemporary ideas when he wrote about the connexions between slave labour and machines (Wilde 1891; quoted in McNeill 2000: 306):

All unintellectual labour, all monotonous, dull labour, all labour that deals with dreadful things, and involves unpleasant conditions, must be done by machinery. (...) The fact is, that civilization requires slaves. The Greeks were quite right there. Unless there are slaves to do the ugly, horrible, uninteresting work, culture, and contemplation become almost impossible. Human slavery

is wrong, insecure, and demoralizing. On mechanical slavery, on the slavery of the machine, the future of the world depends.

Thus, one enabling or contributing condition for the abolition of slavery was the growing feeling that unpleasant work would increasingly be done by machines. Therefore, with the help of all the other moral, religious and ideological arguments which were making slavery progressively morally abhorrent, industrialising nations increasingly thought they could do without slaves. The advent of available non-slave power was not a sufficient condition to trigger the end of slavery, but its absence had prevented its demise to some degree. The first beneficiaries of steam power could not afford to consider the virtue of doing without human slavery until after these non-muscle sources of energy had become adequately available. Once the energy was available, the general public became enabled to think in this new, less exploitative manner. This could help explain the often noted puzzle of why there had been no large scale abolitionist movement before the last quarter of the eighteenth century.

What is well established is the fact that the industrial and technological advance created a diffuse feeling of human progress. Even before machines had started to effectively supersede the work done by slaves, it was widely thought that technology would help mankind free itself from many old constraints (even though it also generated many new concerns amongst the public). As one author put it, "the world is now entering upon the mechanical epoch. There is nothing in the future more sure than the great triumphs which the epoch is to achieve. (...) Look abroad, and contemplate the infinite achievements of the steam power" (quoted in Crosby 2006).

'Muscle power' and slavery were, towards the end of the eighteenth and through-out the nineteenth century increasingly seen as 'backwards' and standing in the way of progress. More advanced societies could attempt to absolve themselves from slavery and claim to be progressives by refusing to use human-labour. Franklin, Washington, Jefferson, and many other prominent Americans increasingly saw slavery as "an immense problem, a curse, a blight, or a national disease". Without slavery, America would be an almost perfect nation (Davis 2006: 154). Slavery, in this view, stood in the way of progress, as Emerson (1863) suggested in 1844: "Slavery (...) does not love the whistle of the rail road". Similarly, Frederick Douglass argued that the laws of political economy doomed slavery: "It [slavery] has an enemy in every bar of railroad iron, in every electric wire, (...) in the steam engine" (Blassingame et al. 1991).

This belief in progress, fuelled by the rise in machinery usage and the psycholog-ical revolution it produced in people's minds, is fundamental for the understanding of the anti-slavery movement in Britain and the United States. Davis remarks how Lincoln "revered the idea of self-improvement, dreamed of America's technological and moral progress, and condemned slavery as a moral and political evil". "The British model of slave emancipation seemed to some liberals by the 1840s and the 1850s to have forecast a global pattern of inevitable 'historical progress'" (Davis 2006: 288; 324). To favour progress also meant to be against slavery: "the assumption that slavery has become both obsolete, as a result of mechanical inventions and the superiority of free labor, and immoral, as a result of historical changes in moral perception (...) clearly contributed greatly to the abolition of "Negro slavery" in the Western Hemisphere" (Davis, Personal email communication).

2.4 Three other aspects of industrialisation which contributed
   to the demise of slavery

Steam-power also indirectly contributed to the abolition of slavery in other direct or indirect ways. First, the 'transport' and 'market' "revolutions" brought about by the advent of the Industrial Age, triggered deep feelings amongst many Christians that "the United States had become increasingly dominated by 'materialism and greed'". These feelings (as well as the increasing burden of alcoholism) engendered the Second Great Awakening. This evangelical revival inspired a large number of abolitionists "who perceived Negro slavery as *the* great national sin" to campaign against slavery in the USA (Davis 2006: 250–252).

Second, the 1830s witnessed the emergence of the steam-driven press. The abolitionists, recognising the cost and time efficiencies, made extensive use of the presses in proliferating their ideas, as in the case of the *Amistad* trial, when millions of abolitionists' pamphlets were printed on New York's presses. A Congressman from Virginia complained in a speech in 1835 that abolition societies, "by means of these two great revolutionizers [sic] of the world, he meant steam power, and the press, had caused to be printed, and by means of the public mails, circulated throughout the slaveholding States, large numbers of newspapers, pamphlets, tracts and pictures (...) calculated to rouse and inflame the passions of the slaves against their masters" (quoted in Miller 1996). As well as steam powering the presses, the distribution of the pamphlets on a scale never before reached was made possible by the new techniques of trains and steam-boats.

Thirdly, and crucially, it should not be forgotten what the victory of the Northern States in the US Civil War—which led to the emancipation of all slaves in the South—owes to its economic and infrastructural power, largely based on coal. This same economic strength enabled anti-slavery campaigners to raise large amounts of money and to pay seventy employees working full time for the cause. Even in Britain, there were up to six full time paid agents devoted to the anti-slavery campaign (Davis 2006: 260–261; 302–307).

2.5 Change in sensibilities and political activities

Even more importantly, the arrival of steam-power and modern techniques triggered formidable transformations in people's way of life. People were better and more regularly fed, and engaged in jobs that were perhaps more alienating but often less physically demanding than agricultural work (Smil 1995).

The agricultural revolution which started in the eighteenth century and enabled people to be better fed is directly linked to the Industrial Revolution. The improvement in tools and machinery—seed drills, iron ploughs, threshing machines—rested on the scaling up of metallurgy, which, in turn, increasingly relied on the burning of vast amounts of coal as whole countries were threatened by deforestation. The growing use of coal instead of firewood also enabled farmers to devote more time to other tasks (Debeir et al. 1991: 150). Ashes and soot resulting from coal combustion, as well as animal dung previously used as cooking fuel in peasants' households could also increasingly be spread on the soil, where it would return precious nutriments and increase yields. Shipments of nitrogen fertilizers from South America to Europe and the United States—increasingly made on iron steam-ships,

which made transcontinental transportation cheaper, quicker and safer—also grew exponentially in the 1840s (Smil 2000: 42). Information, fertilizers, seeds, new crop species or harvested plants could travel more easily by railways or steam-boats. This, coupled with new ways of conserving food in cans (Nye 1999: 117–118) also contributed to a self-reinforcing process which enabled the overall enrichment of western societies and the general retreat of dearth (with infamous exceptions, such as Ireland in the late 1840s). As Smil summarizes, "no traditional agriculture could consistently produce enough food to eliminate extensive malnutrition. (...) Only the inputs of fossil energies (...) could sustain both an expanding population and a higher per capita availability of food" (Smil 1995: 81–83).

The general enrichment of western societies had an indirect impact on the abolition of slavery. It enabled a general rise in standards of living, life expectancy and sensibilities. At a time when people were struggling to feed themselves or their families, and where death was omnipresent, the idea that life was harsh and violent was deeply entrenched in the psyche. They were more accustomed to suffering and their levels of sensibilities were probably much lower than now. This provides some explanation for a certain amount of insensitivity to the suffering of slaves amongst Europeans in the sixteenth and seventeenth century. "When life expectancy at birth rose only to the low twenties, everyone was accustomed to ghastly rates of death from disease, especially in towns and cities where epidemics killed up to twenty percent of the people every twenty five or thirty years. (...) New World slavery emerged at a time when most people took it for granted that this world was a very cruel, sinful and brutal place (Davis 2006: 95–96).

2.6 Conclusion

Inglehart has argued that post-industrial societies are shifting from pursuing materialist aims, such as economic and physical security, to increasingly emphasizing quality of life and the development of personal identities. Throughout history people had always been forced to give the utmost priority to survival needs. But the rise in standards of living of the post-second world war era, the huge increase in the availability of food triggered by the "Green Revolution" and the emergence of the welfare state gave rise to conditions under which most people increasingly took survival for granted. The new generation increasingly cherished self-expression or free choice to the detriment of traditional values. This shift can also explain the rise in the number of people defending "post-materialist" values, such as pacifism and environmentalism (Inglehart 1977). This was also recognized in the 1987 United Nations report *Our Common Future*, prepared by the Brundtland commission on the Environment, which advocated "sustainable development" but recognized that people in developing nations "will not be interested in preserving the environment unless they have a better standard of living, without poverty or ill health" (Nye 1999: 262).

Inglehart's ideas about the "Changing Values and Political Styles among Western Publics" (the subtitle of his book) can be extended and applied to the changes brought by industrial society itself. The gradual improvement in people's lives and life expectancy, brought by the industrial and agricultural revolutions, powerfully contributed to the rise of sensibilities which influenced the campaign against slavery. In the nineteenth century, people were increasingly concentrated in cities, had better

access to networks of information, and probably more free time to join in some sort of political activities, such as signing petitions or joining associations.

Moral standards thus also arose, in part, for very materialistic reasons and can therefore be related directly to the Industrial Revolution. The advent of the steam power had not been a sufficient condition for the abolition of slavery, but it was a major facilitating condition and might have been a necessary one.

The validity of this assertion is further evidenced by historical counter-examples. When technology becomes once more unavailable (e.g. for lack of fuel) or free labour becomes scarce, it is not rare to witness the return of forms of bonded labour. After the demographic decline (and lack of manpower) following the Black Death in Europe, the slave trade was greatly revitalised in Europe (Pétré-Grenouilleau 2004: 48). Likewise, from the seventeenth century onwards, slavery, which had previously almost entirely disappeared from European Societies, experienced a new golden age across the Atlantic. America, which was indeed lacking humans and work animals and some settlers, therefore thought the continent was left wanting in "energy equipment". African "human engines" were imported and became the "ultimate solution to America's prolonged energy shortage". Slavery regained a lot of its lost vigour due to the perceived necessity. In Europe, "the resurgence of a slave proletariat in German Europe between 1939 and 1945 as a consequence, among others, of the disintegration of the continental energy system, is yet another illustration of how the human slave converter has operated in history as the energy of last resort. During World War II, it became a component of the Nazis' emergency energy reserve to a far from negligible extent" (Debeir et al. 1991: 11).

3 New similarities in slave ownership and fossil fuel usage

In order to minimise the risk of the reappearance of slavery on a large scale (a possible consequence of an energy shortage caused by our relentless consumption) or the danger of unbridled climate change (also caused by our extravagant burning of fossil fuels), perhaps we do not need technological fixes or 'superhero' politicians but a change in general attitudes. After all, the overwhelming majority of industrialised countries are democracies and elected representatives are supposed to do what their name implies, i.e. represent their citizens. A general change in attitude will only happen if people are convinced, emotionally as well as intellectually, that our relentless use of fossil fuels has become dangerous and morally wrong. This section will attempt to do exactly that.

We have seen above that, since Aristotle, people have anticipated that automated engines could replace human labour and slaves. The idea, far from fading away, is currently making a powerful comeback, at the very time when western societies are contemplating a possible end of this era. Suddenly, the services given by machines, which had been for a time taken for granted, become visible again. There are nowadays an ever growing number of people who argue, again, that modern technology is now replicating the services once provided, in rich families, by slaves and servants.

Fossil fuel-powered machines and slaves play(ed) similar economic and social roles in the societies in which they operate(d). Both slave societies and developed countries externalise(d) labour. In the first case, labour came from slaves; in the other, 'work' is provided by machines. Consequently, there are many similarities

between our dependence on fossil fuels and slave societies' dependence on bonded labour. In addition both slaves and modern machines free(d) their owners from daily chores. They gave and continue to give individuals the leisure to read and write, perform arts, get informed and participate in politics. If we all wanted to benefit from our current lifestyle without any fossil fuels, we would need to employ several dozen people working full time for us. The human exploitation and suffering resulting (directly) from slavery and (indirectly) from the excessive burning of fossil fuels are now morally comparable, even though they operate in a different way. We now know that when we burn oil or gas above what the ecosystem can absorb or when we are depleting non renewable resources for leisure, we are indirectly causing suffering to other human beings, today and in the future. Similarly, cheap fossil fuels facilitate imports of goods produced in countries with little or no social protection and hence help externalise labour and perpetuate slave-like conditions.

3.1 Definitions and limits to the argument

Before going any further, it is important to start by defining slavery, usually understood as: "someone who is legally owned by another person and works for them for no money" (*Longman Dictionary of Contemporary English*). However, such a definition is inadequate for at least two sets of reasons. First, historically a large number of what most people would consider as genuine slaves were not "legally owned" at all. That is why Patterson has argued that defining humans as property is not an essential constituent of slavery. For him slavery is "the permanent, violent, and personal domination of natally alienated and generally dishonoured persons" (quoted in Davis 2006: 30). This definition still applies today for most slaves. Second, slaves were occasionally given money as a reward for their work, or they could own, sometimes, considerable properties or their own business.

As Davis points out, it is extremely difficult to find a workable definition of slavery:

> One can imagine a spectrum of states of freedom and dependency or powerlessness, with various types of serfdom and peonage shading off into actual slavery. Within the category of slavery itself, we can also imagine a spectrum of slave systems beginning with those that accord slaves a variety of protections and rights (...) It is clear that some forms of contract and prison labor have been harsher and more lethal than most examples of slavery (...). If the labouring prisoners in the Nazi death camps and in Russia's gulag were not legally defined as owned chattel property, they were thereby completely made expendable and could be starved or frozen to death or simply shot, without any recognizable loss. In terms of material standards of living, the slaves in the nineteenth century American South were clearly far better off than most slaves and forced labor in history; yet they were victims of one of the most oppressive slave systems ever known (Davis 2006: 36)

For the purpose of my comparison, and because most people associate slavery not only to a form of legal ownership and free work, but also to the absence of liberty, harsh-treatment, family separation, and fear, I will adopt the following definition, based on Patterson's definition: slavery is "the permanent and violent domination of alienated and generally dishonoured persons who are performing work or services

for the benefit of their owner". From this perspective, slavery is an end point on a spectrum of exploitation rather than a practice qualitatively different from any other form of exploitation.

Readers may find this definition of slavery problematic. For many, nineteenth century African slavery is the archetype of all forms of slavery, whose consequences are felt most profoundly in the USA. The idea of ownership was a key component in both the justification for and ultimate demise of chattel slavery. Thus, the comparison between fossil fuel use and slavery does not fully work if one applies it specifically to the Americas. Yet chattel slavery was not necessarily the worse form of bonded labour: today some forms of slavery, which do not involve formal ownership, might be even more cruel; and I am comparing our use of fossil fuels to all forms of slavery, not 'just' nineteenth century American slavery.

Also, when the word "machine" or the phrases "energy slaves" or "virtual slaves" are used in this text, I imply that they refer to machines powered by fossil-fuels. This is both for the sake of brevity and because most machines today are directly or indirectly powered by oil, gas or coal. Of course, some machines are powered by hydro or nuclear electricity, which is (nearly) carbon free. However, a vast majority of electricity worldwide is produced by coal or gas-fired power stations. According to the most recent estimates, thermal electricity generation (coal, gas and oil burning) accounted for 66% of the total, while hydro-electricity accounted for 16%, nuclear 14%, and geothermal, solar, wind, wood and waste only 2.2% (AER 2006). In theory, fossil-fuels could be replaced by nuclear or wind and solar power. However, most commentators doubt that these energies could be scaled up to the extent needed to replace fossil fuels in the near future (Monbiot 2006). It is impossible to discuss nuclear power here in detail. Nuclear power—if all goes well—again would not stand the second part of my comparison with slavery. However, if things go wrong, its potential to create harm and suffering is very powerful indeed and has been demonstrated in the past (Power 2008). There is also the huge moral problem relating to the considerable amount of hazardous waste we will leave future generations and the potential for the spread of nuclear weapons.

The comparison between slavery and the excessive consumption of fossil fuel which I suggest in the following pages are by no means a perfect match. My argument is not that slavery and the excessive 'luxury consumption' of fossil fuels are equivalent, but rather that they present striking similarities, with some notable differences.

The first distinction lies in the different ways by which suffering caused by slavery, on the one hand, and by the burning of fossil fuels, on the other, operate. In the case of slavery, oppression operates more or less directly. Slaves usually have names, faces, personalities, and their owners can directly make them suffer and immediately see the results. In the fossil fuel economy, however, the sufferings engendered by the burning of fossil fuels are indirect and often imperceptible by those who are causing it. It is difficult to recognize the potential connection between a coal-fired power plant in Europe and a refugee camp in Africa today and even more complicated to grasp the effects of Climate Change for future generations. The comparison thus ignores the direct human experience that characterised slavery. We cannot see the consequences of our burning of fossil fuels in the same way as slaveholders could see the suffering inflicted on their slaves; realisation of the consequences are delayed chronologically and removed geographically (Hulme 2009: 200–201). (However,

many people—for example consumers of slave goods—also benefited from slavery without maintaining direct connections to it. These people can certainly be said to have committed a morally equivalent sort of human transgression to people who benefit from fossil fuel use).

A second, crucial, difference, is that there is no willingness to cause harm or dehumanize others by burning fossil fuels. By contrast, motives for enslavement were, and are, by no means limited to economic needs and frequently included a willingness to control others, even sometimes including sadism. As Aristotle himself recognised, in contrast to his vision of machines doing the work of slaves, there are strong psychological benefits from totally dominating other human beings. Adam Smith wrote in 1776 that the main motive for slavery was to "dominate, degrade, humiliate and control—often in order to confirm their own sense of pride and superiority". As Davis puts it, "chattel slavery is the most extreme example we have not only of domination and oppression but of human attempts to dehumanize other people" (Davis 2006: 2; 3; 29).

3.2 Machines and slaves play(ed) similar economic and social roles

In a recent article, Marc Davidson, drawing on two earlier comparisons (Orr 2000 and Azar 2007) convincingly argued that there are similarities "between the rationalisation of slavery in the abolition debates and the rationalisation of ongoing emissions of greenhouse gases in the US congressional debates on the Kyoto Protocol". For example, Davidson argues that "in both debates US congressmen and Southern congressmen, respectively, represent an electorate with substantial interests in maintaining the status quo, costs are shifted to people who are not part of the electorate, and Congress rejects proposals for change" (Davidson 2008: 67–68).Yet it is possible to go much further and find even deeper connections.

My comparison starts with an hypothesis that it is a feature of human nature that whenever societies have had the opportunity to find someone *or something* else to work for them for free, or for a small cost, they have almost always taken advantage of it, whatever the moral cost. The way this operates, irrespective of gender, class, religion or ethnicity, is amply demonstrated by the fact that there were a number of slaveholders, in the American South or elsewhere, who had themselves been slaves. If slavery reminds us of "our [slaves and slave-owners alike] shared humanity, not only our triumphal possibilities but also our profound limitation" (Davis 2006:180), the same could be said of fossil fuel usage.

Both slave owners and inhabitants of developed countries relied, and still rely, on work generated from an external source of energy to enjoy their particular lifestyle. In the former case, labour came from slaves; in the latter, it is derived from 'work'—in the sense physicists use the word—which is mostly provided by energy from fossil fuels. As Davidson puts it: "today the United States is as dependent on fossil fuels for its patterns of consumption and production as its South was on slavery in the mid-nineteenth century".

Of course, Davidson's comparison cannot be measured exactly. Quantifying the value in today's money of all slaves in the Southern States in a meaningful way is extremely difficult, as it is to determine the value of fossil fuels in today's

world. Moreover, the dependence on fuels cannot be accounted for by quantitative economic analysis alone (Debeir et al. 1991: 124).

Even though it is impossible to make a robust, like-for-like comparison, as forms of energy, there are clear similarities between our current economic dependence on fossil fuels and the nineteenth century economy's dependence on slaves. The United States and, to a large extent, the rest of the world, are far more reliant on fossil fuels today than the US economy—or any other economy—has ever been on slavery. Several scholars have long claimed that this dependency jeopardises our very survival: "proper alternative sources of energy that can substitute for fossil fuels must be found to prevent mankind from reverting to an agricultural level of activity which would mean a dramatic and painful reduction of both mankind's size and its level of living" (Cipolla 1978: 63; many comparable claims are made in the literature on 'peak oil').

In fact, the US Southern State reliance on slaves was partially an illusion, as demonstrated by the rise in cotton production after the abolition of slavery. Likewise, our current dependency on fossil fuels is also somewhat of an illusion; we could consume far less energy than our present levels, while being as healthy and happy (perhaps even more so) as our current high-energy consuming world (Illich 1974). Yet, if we want to maintain current standards of living, our dependency on fossil-fuel is excessive. This is especially true when new structural constraints, which were irrelevant or of peripheral concern to previous societies—such as the substantial increase in the global population, urban-sprawl, or the hyper specialisation of contemporary economies—are taken into account.

Another way of evaluating current dependencies on 'virtual slaves' is to consider how much people-effort would be required to replace work done by machines. At the end of the nineteenth century, for example, human labour still accounted for about 95% of all industrial work in the US—and this was generally true of all traditional societies—whereas, today, it constitutes only 8% (Berry et al. 1993). A century ago, Oscar Wilde considered the steam engine to be the functional equivalent of servants or slaves. However, the term 'energy slave' (and subsequent efforts to quantify the average number of such slaves per person in the world), seems to have first been coined by American philosopher R.B. Fuller in the early 1950s. His estimate was that in 1950, each individual on earth had approximately 38 "energy slaves" at his disposal (Fuller 1969; Marks 1964). This concept has since been used widely: I have found over twenty references to "energy slaves" in publications, although these are sometimes phrased slightly differently, for example as "mechanical slaves".

The implication is clear; if we wanted to maintain the same lifestyle without petroleum, coal, natural gas, we would need to employ several dozen persons, or more, on a full-time basis (The exact number of 'virtual slaves' depends not only on the period and the country considered, but also whether one takes the average amount of mechanical work a healthy human could do in a year (as Fuller does) or the average amount 'energy slaves' working 24 h a day, 365 days could do in a year (as McNeill does)). This astoundingly high figure comes from the fact that a single litre of petrol contains the equivalent of about 9 kWh of energy, while the output of an average human being is about 3 kWh in the course of a 40-h working week. Even if human labour involves more than just an output of kWh, it is reasonable to suggest that we pay little for our oil when compared to the amount of 'work' fossil fuel can

provide. It is no wonder that people in past centuries enthusiastically adopted new energies, or that the majority of us want to continue to enjoy the numerous positive aspects of fuel-powered machines.

3.3 Both fossil fuel usage and slavery cause(d) harm to others

Besides the similarities between the convenience brought to us by fossil fuel powered machines and the convenient life slaves brought to slave owners, another parallel exists between the harm caused to human beings by slavery and the harm caused by the current large scale burning of fossil fuels. I do not want to imply that all fossil fuel burning is bad. A useful distinction can be made between 'luxury emissions' and 'survival emissions'. "One unit of carbon dioxide emitted by an Indian peasant farmer, essential for subsistence, carrie[s] a different moral weight to a unit of carbon dioxide emitted by an American tourist flying to the Bahamas" (Hulme 2009: 159; Agarwal and Narain 1991).

Some might argue that it is not possible to compare pain triggered by the use of slaves and pain caused by the use of oil, gas or coal, as in the latter case we are dealing with inanimate objects that cannot suffer. However, when we burn oil or gas above what the eco-system can absorb, we are indirectly causing suffering to other human beings. The reports from the Intergovernmental Panel on Climate Change (IPCC) make it clear that the release of carbon dioxide is already causing harm by increasing droughts and flooding, threatening crop yields and displacing large numbers of people, and this damage and suffering is set to rise in years to come. The future looks grim for the world, whether the IPCC looks at freshwater resources and their management, ecosystems, food or health. The predictions for Africa, the continent where the slave trade involved more people and lasted longer than in any other place in the world, are even more worrisome: "By 2020, between 75 million and 250 million people [in Africa] are projected to be exposed to increased water stress due to climate change. (...). Agricultural production, including access to food, in many African countries and regions is projected to be severely compromised by climate variability and change" (IPCC 2007).

If we accept the conclusion of the IPCC, we must recognize that we are now fully aware of both the causes of climate change and its consequences. It is no longer possible to argue that our use of oil is morally neutral. Driving cars or flying *does*—however indirectly and unwittingly—hurt people now. And because emissions accumulate in the atmosphere, they will increasingly continue to do so in the future, unless the trends reverse, somehow.

For those who are still unpersuaded that climate change is hurting people, or do not believe that the climate is being significantly altered by human activity, there is still the moral, as well as practical, problem that by using fossil fuels, we are depleting very valuable resources that are not renewable. Scholars like Jared Diamond (2006) have vividly told cautionary tales of societies disappearing because they relied on a staple source of food or energy that they subsequently exhausted. Britain had oil in the North Sea, much of which is now gone forever. The nation has used a resource that its children will not be able to benefit from. Because the oil and gas have been burnt in large part for 'luxury emissions' rather than 'survival emissions' and with

little concern beyond the 'carpe diem' mantra, it has not replaced it by anything of similar value. The next generation will inherit the worst consequences of this cheap energy lifestyle (if we leave aside anthropogenic climate change, we could add pollution, obesity, the spread of concrete over arable land and greenbelt, and the consequent development of highly unsustainable suburbia, to the litany).

One could of course rightly argue that "human history since the dawn of agriculture is replete with unsustainable societies, some of which vanished but many of which changed their ways and survived" (McNeill 2000: 358). History is useful as it can remind us both of the ingenuity of the human species to solve problems in the past and, at the same time, of the dangers involved in depleting resources too quickly. It is also true that previous generations have often left huge debts to their children. However, climate change is a new problem taking place on an unprecedented scale. In any case what previous generations did cannot justify our wrongdoings now.

Similarly, how should we respond to the moral problem that in a world where poor people struggle to find enough food to feed their families, we are burning *food* to run our cars or heat our homes? This had direct consequences for the world's poor, as bio-fuel production tends to drive upwards the price of cereals worldwide, directly affecting the poor. This led, for example, to riots occurring in Haiti in 2008 over the price of corn. Some remorseless companies go as far as to encourage people to burn corn instead of wood pellets: "heat your home for a bushel of corn per day" claims a Canadian company (Caneco 2008). Filling up a large car's fuel tank with ethanol uses enough maize to feed a person for a year (Economist 2007). Put starkly, the rich are buying up food to run cars at the expense of the world's poor (Douthwaite 2007). We are also clearly putting our societies and our children at risk by relying so heavily on fossil fuels. In the same way as slave owners frequently worried about slaves escaping or revolting, we also regularly worry about our suppliers of oil or gas stopping deliveries of this precious liquid. The US, UK, and Netherlands, for example, refused to sell oil to Japan in 1941, with the consequences we know; in the 1970s, the OPEC reduced their production of crude oil, triggering a worldwide crisis; and more recently still, Russia has cut off natural gas shipments to Ukraine. Industrial countries have also become involved in an increasingly violent politics of oil in countries such as Iraq, the Sudan and Nigeria to mention a few.

This situation could—once more—be compared to the attitude of slave owners who benefited for a limited period of time from free labour, but then left the task of dealing with the dire consequences of slavery to their children. For example, African Americans as a group continue to be disadvantaged economically and socially in many areas compared to other US citizens. It is often difficult to separate the legacy of the segregation era from the legacy of slavery (and other factors), but it has long been suggested that the separation of slave men from their families might be an ongoing contributory factor to the fragility of black families in contemporary American society (Elkins 1959; Moynihan Report 1965). Black families are less likely to form and more likely to break up than White, Hispanic or Asian families and, to take a trivial example, a greater proportion of children from single families commit certain crimes than children from two-parent families. This, combined with some rampant racism (another legacy of the slavery era) makes it easier for Blacks to get arrested: "although blacks account for only 12 percent of the U.S. population, 44 percent of all prisoners in the United States are black (...) Indeed, nearly five percent

of all black men, compared to 0.6 percent of white men, are incarcerated" (HRW 2003 and USCB 2006). This comes at a high cost for US society as a whole which still has to be paid nearly 150 years after the Thirteenth Amendment to the United States Constitution abolishing slavery.

One might at this point object that the comparison still does not stand, because slavery is against the law, while using fossil fuel is not. This is easily dismissed, however, as slavery *was* perfectly legal at one point and was only prohibited after the culmination of several contributing factors (such as anti-slavery campaigns, the changing socio-economic climate, and the shift in moral attitudes, as discussed above). Yet, even when slavery was legal, numerous alibis were invented to justify it. A similar phenomenon can be observed today, as people increasingly feel the need to justify their high energy use. Is it completely unthinkable that one day driving highly inefficient vehicles might be outlawed when much 'cleaner' alternatives exist?

Another objection to the present argument might be that the harm caused by climate change is unintentional. On this view, as the damage is not deliberate and the consequences are not always tangible, we cannot be blamed for this damage, or at least not as severely as if it were deliberate and the consequences were known. For example, since many people were unaware that burning fossil-fuels could cause harm until very recently, previous generations cannot be blamed for it. This is a perfectly valid argument. The context in which machines were introduced is important. It would be unfair to blame American farmers who purchased tractors and fertilizers and saw these as incontestable help in feeding their families and the rest of the world; or women who bought washing machines to be freed from family chores. It would not seem just either to say that people who were emitting carbon dioxide a hundred, or perhaps even 20, years ago are responsible in the same way as we are now with our knowledge of the climate consequences (a similar case, with hindsight, could be made against them for the rate at which they were burning valuable resources, destroying eco-systems or damaging people's health by creating smog, but we could not blame them for climate change for they did not know, or at the very least did not have a clear idea of, the likely consequences). If previous generations made a mistake by burning fossil fuel carelessly, they mostly did this with a clear conscience and in the good faith that they were trying to improve their own and other people's lives.

It is also true that it is more difficult for us to grasp the consequences of our actions than it was for slave owners, as the consequences of greenhouse gas emissions are indirect and usually mediated through a vapid media. Some people remain genuinely perplexed about the causes of climate change, a responsibility for which rests, to a considerable extent, on the fossil fuel lobbies as well as recalcitrant governments unwilling to clearly impart scientific findings to their citizens (Gore and Guggenheim 2006; Oreskes 2007).

The 'unintentional damages' argument only stands for previous generations who had no idea of the likely consequences of burning fossil-fuels. For people living today, it only stands as long as we are ignorant of the fact that the way we live is having devastating consequences for others. For most reasonably informed people now, it is hard to ignore the warnings of scientists. Even for those who are not fully convinced of the causes of climate change, should we not be using precautionary measures if there are reasonable grounds to believe that we might be changing the climate? As many already pointed out in the 1990s, "if the models were faulty, future climate change could be worse than predicted, not better" (Weart 2003: 180).

Davidson makes a similar point when he compares the inconsistent attitude of US congressmen who decided to approve the war in Iraq but constantly refuse to act on climate change on the basis that there is, they argue, insufficient evidence that man made emissions are creating harm (Davidson 2008).

If the lobbies referred to above have been so easily able to spread doubts among many intelligent people, it is perhaps because many of us prefer to avoid the conclusions of the IPCC and the present comparison helps us to understand why. If we disagree about Climate Change, it is perhaps not only because of "our different attitudes to risk, technology and well being; our different ethical ideological and political beliefs; our different interpretations of the past and our competing visions of the future" (Hulme 2009: xxvi), but because, at root, we also all have strong vested interests in not believing the climate science. Rich countries are mostly democracies where large sections of the general public do not want to change their lifestyles, something politicians know very well. In Eastern Europe, when parliamentary regimes were re-established after communism collapsed, environmental problems "caused by foreigners, the military, or specific factories were often addressed and sometimes resolved. Those caused by the consumption patterns of ordinary citizens often got worse under democracy". This seems to be a general pattern in parliamentary regimes (McNeill 2000: 348; 353).

Even then polities and publics alike continue to clutch at straws. For example, IPCC predictions that a 1–3°C temperature rise will see some potential advantages for global food production, and 'bring some benefits, such as fewer deaths from cold exposure' in temperate regions (predominately in industrialised countries) are sometimes treated as grounds for extolling the fossil fuel economy, including for future generations. And this in spite of the IPCC's overall estimation that "in the aggregate, however, net effects will tend to be more negative the larger the change in climate" (IPCC 2007).

In the effort to claim that climate change might be a good thing, however, once again we can hear the same kinds of self-serving justifications used by slave-owners. Nineteenth century slave-owners, for example, claimed that the work of slaves would benefit future generations or that slaves were actually better off 'working' in the USA than they would be 'working' in England's factories. For instance, US Vice-president John C. Calhoun argued on the senate floor in 1837: "The Central African race... had never existed in so comfortable, so respectable, or so civilized a condition as that which it now enjoyed in the Southern States"... Slavery was not "an evil. Not at all. It was a good—a great good" (quoted in Davidson 2008: 72). Some also thought that freed slaves would be unable to feed themselves or be responsible for their own fate. The same kind of arguments had been used by apologists of slavery since antiquity.

It is also true that it is practically impossible in our contemporary world, even for the most virtuous, to live without relying on some sort of energy of the fossil variety. We are subjected, as individuals, to constant invitation (from corporations, governments or peers) to consume ever more. We are perhaps, like drug addicts, as much victims as culprits of this consumer or technological society (Illich 1974). It could even be argued that we ourselves are slaves of our way of life: it is a well-known paradox that slave owners tend to become dependent on their slaves, or as Emerson put it (1863: 98) "If you put a chain around the neck of a slave, the other end fastens itself around your own". Our dependency on fossil fuels for energy extends to the very machines we rely on in our daily lives—the computer I am using to write this

article confirms this general rule. If we cannot do otherwise, one could argue that we cannot be blamed nor can we prevent ourselves from hurting others. Slave owners were therefore more to blame than we are, because they could at least emancipate their slaves and choose a virtuous life.

Yet, one should not under-estimate the struggle that most slave owners experienced in the decision to free their slaves. In the nineteenth-century American South, state laws "restricted or in effect prohibited manumission" (Davis 2006:193). By the same token, we should not over-estimate our own difficulties in reducing carbon dioxide emissions. After all, while it is fairly easy to install low-consumption light bulbs or to switch to a provider of renewable electricity, still very few of us do this. If we were able to distribute an equitable share of carbon dioxide allowance per person, and to keep the overall international emissions under the threshold of what worldwide carbon sinks can absorb each year, our (reduced) emissions would gradually slow down the rate of climate change. This is exactly what—perhaps over-simplistic—schemes such as "Contraction and Convergence" propose (Bows and Anderson 2008).

There remains, however, a final objection to the slavery vs. fossil fuel analogy. As we have seen above, most definitions of slavery emphasise the idea of complete legal ownership and control by a master over a person who has to work for them for free. By contrast, we would claim that we do not compel anybody to work for us for free as consumers of fossil energy. Phrased differently, if the result of the work of a slave can be compared to the result of the action of machines through the combustion of fossil fuel, the process of the exploitation itself is different. This is again true to some degree, even though I have already partly addressed this point and shown that slave-owners did not necessarily own their slaves legally nor compel them to work for free. Besides, this objection can be challenged on two grounds:

First, our 'global economy' rests on Ricardo's famous comparative advantage concept, which is based on the assumption of negligible transport costs. The availability of comparatively cheap energy is a required condition for the transportation of foreign goods on a massive scale over large distances. One of the main reasons why rich countries import inexpensive products is due primarily to the fact that manpower, in the so-called 'developing world', is much less expensive than in more affluent countries. Yet inexpensive energy has, in a way, enabled us to delocalise sub-standard working conditions. Workers in 'developing countries' on which we rely to sew our jeans and trainers often have little or no liberty of movement or choice of employer and often experience ill-treatment, when they are not simply inmates in state prisons (conditions which sadly fit my definition of slavery only too well). Their conditions are sometimes perhaps harsher than those of slaves in traditional Caribbean or American economies: "chattel slaves represented a valuable investment, an investment of rising value in much of the new world, but that slightly protective aspect of chattel slavery (...) does not apply to the many millions of bonded and coerced workers in today's so-called developing world" (Davis 2006: 329–330). Reports of these appalling working conditions frequently appear in Western newspapers and so we cannot claim that we do not know. Cheap transport, relying on fossil fuels and, as a consequence, contributing massively to climate change, is what makes this deplorable reality possible. It is true, however, that even if fossil fuel use makes this direct human exploitation possible, fossil fuel use cannot be equated to human exploitation itself.

Secondly, the harm of climate change often amounts to violence or force against a large number of people, and will increasingly do so. Through a series of steps, starvation or the destruction of eco-systems amounts to denying people the freedom to make decisions about their lives. Floods, droughts and rises in sea level will force millions of people to become refugees. According to estimates, "when global warming takes hold, there could be as many as two hundred million people overtaken by sea-level rise and coastal flooding, by disruptions of monsoon systems and other rainfall regimes, and by droughts of unprecedented severity and duration" (Myers 2002). Many of these refugees may end up in camps, where they will not be much better off than prisoners. Forced from their homes and families, their land may be taken away and some may end up having to work for unscrupulous masters or in prostitution rings (another form of slavery in which refugees are already over-represented).

Even those fortunate enough to stay on their land, such as the vast number of peasants in the 'developing world', may find themselves, in their struggle to feed their families, victims of debt bondage, a condition which 'can hardly be distinguished from traditional slavery' (OHCHR 1991). As crop failure is a common trigger to debt bondage, it is not unreasonable to link, however indirectly, our climate change-inducing emissions to mechanisms that are reducing people to a form of slavery. This is not a new phenomenon: ecological factors such as droughts (triggering dearth and/or debts) have long been an important contributing factor in reducing people to slavery during the Atlantic slave trade era (Pétré-Grenouilleau 2004: 118).

4 Lessons from history and conclusion

Comparing the attitude of slave owners and our own attitude to petroleum is both adequate and useful.

By emphasising the human tendency and desire for convenience, which drove (and continues to drive) the use of slaves (real or virtual), our collective inaction in the face of climate change and our addiction to cheap energy can be explained. It enables us to take stock of our resistance to change and legislation against ever increasing fossil fuel usage. This explanation also shows that the problem of climate change is deeply rooted. The human tendency to "externalise labour" and "dominate, degrade, humiliate and control", as evidenced by the almost universal practice of slavery will percolate in any and every system.

However, Climate Change and fossil fuel depletion could be the galvanising forces that enable us to address many of the excesses and injustices so visible in the world today. Climate change can thus be seen as an opportunity, rather than as a problem. "Investigations into the causes of climate change have shown us—in case we preferred to forget it—that our world is a very unequal one". Similarly, Climate Change "teaches us—in case we were complacent—that our current energy portfolio is not sustainable" and that "we should do what we can to conserve carbon-based fuels and that we should accelerate the search for new, non-carbon based energy sources" (Hulme 2008).

The comparison is also useful because virtually everybody now agrees that slavery is wrong. If we accept the comparison, it follows that we are better enabled to see and *feel* the iniquity of continuing to burn fossil fuels inconsiderably and emotions are

often more capable of mobilising us than logical reasoning (Weber 2006: 104). That is, if we are convinced that we are behaving like slave-owners (whom we morally condemn), we are more likely to want to act differently.

If we accept that the root of the problem is very similar in the case of slavery and the excessive burning of fossil matter (i.e. our own human limitations and tendencies to become indolent and addicted), the history of the campaigns to end slavery can provide lessons and encouragement. Encouragement, because despite the high cost of ending slavery in Britain and the United States, both countries eventually abolished it.

Even when legislation is put in place to cut carbon dioxide emissions, it is important that the general public continues to support efforts to reduce emissions, otherwise laws will be resented and not respected (Roodhouse 2007). Those who instigate legislation should thus remain vigilant: it is important to remember that the Southern states managed to thwart reconstruction and propagate a system of segregation and oppression for another hundred years after the end of the American Civil War. For ex-slaves, conditions sometimes became worse than during the slave-era itself (Fogel and Engerman 1974).

Understanding the processes by which slavery was abolished is also useful. We can recognise the role played by the arrival of fossil fuel in the abolition movement. This new form of energy, which appeared much more morally acceptable than slavery, greatly facilitated campaigns to abolish this inhuman institution. Thus considerably more efforts should be put today in researching new forms of energy which will not produce greenhouse gases. Clean energies should thus become rich nations' utmost priority.

The examples of what worked and what did not in the campaigns to abolish slavery could be put to very good use today. For example, hard-line stances and self righteousness seem to have been rather counter-productive in the case of the abolition of slavery. Davis has suggested that "Garrison's eccentricities and extreme rhetoric may have deterred many potential converts", and that this might explain why "American abolitionism was always confined to a small minority". Lincoln won the Republican nomination for President because "he appeared more moderate and less controversial than the better-known Senator William Seward of New York (...). Like most westerners, Lincoln took a dim view of abolitionists and said on occasion that he loathed their 'self-righteousness'", even though he said that he had always hated slavery (Davis 2006: 9, 307, 288). Unfortunately, moderation and pragmatism from individuals deeply committed to ending slavery could be very hard to distinguish from the hypocrisy and pseudo-moderation emanating from others who advocated change through small steps aimed, ultimately, at delaying reforms, not abolishing slavery.

Self-righteousness (from abolitionists and climate change campaigners alike) is not only deterring a lot of people from joining the ranks of campaigners, it is also deceptive. Some people will sometimes make extreme efforts to reduce their consumption by a tiny amount. Yet, as one recent study has shown, "people who believe they have the greenest lifestyles can be seen as some of the main culprits behind global warming". For example, "people who regularly recycle rubbish and save energy at home are also the most likely to take frequent long-haul flights abroad. The carbon emissions from such flights can swamp the green savings made at home" (Barr et al. 2009).

Some others will show their commitment by spending a lot of time buying 'local' or non 'air-freight' products. Similarly, during the slavery era, many people were committed to buying sugar or cotton that had not been produced by slaves, but were instead products of "free labor". Initially, the abolitionist movement supported such early incarnations of "fair trade". Yet, the US movement quickly recognized that this was not going to solve the problem: while the boycott of sugar produced by slaves had some discernible impacts in Britain in the 1790s, in America the free produce movement never reached a critical mass. It had probably no effect on slave-owners themselves—who did not feel threatened (Glickman 2004: 903). They quickly recognised that the labour of slaves could be seen virtually everywhere. As one campaigner complained: "'No anti-slavery agent or other abolitionist must now travel in stage or steam-boat, for the sheets and table cloths of the latter are of cotton. No abolitionist can any longer buy a book, or take a newspaper printed on cotton paper'. Related to these seeming pragmatic claims was a moral one: slaves would be better served if abolitionists spent their time in the political fight against slavery. Free produce advocates were 'so occupied by abstinence as to neglect the great means of abolishing slavery' claimed Garrison" (Glickman 2004).

It is important to stress here that my argument is certainly not to reject fair-traded products or low carbon lifestyles. Some of the boycott tactics used and described in Glickman's article worked and could be applied today. But some others might be counter-productive and induce a "holier than thou" attitude, thus distracting us from the fact that individual changes to lifestyles often have a minor impact and on their own cannot be the solution to climate change.

It is also important to acknowledge that slavery was not abolished in its entirety to start with but through a series of tactical tricks and compromises. After realising that it would be almost impossible to abolish slavery 'in one fell swoop', campaigners in Britain chose to focus strategically on abolishing the slave-trade first. A watered-down bill was surreptitiously introduced that "only" banned British merchants from participating in the slave trade with foreign colonies. This was a shrewd move, as this bill went somewhat below the radar of the pro-slavery faction, by concealing all humanitarian motives. The focus on national and military self-interest was difficult to attack and hence the Foreign Slave Trade Bill was easily endorsed by parliament in 1806. Yet, this seemingly innocent bill was part of a step-by-step approach which was calculated to weaken the powerful lobby who were opposing the end of the inhuman trade altogether. It made possible the acceptance of the Slave Trade Act the following year (Anstey 1975: 321–425). By contrast, Garrison's reluctance to accept anything but the immediate and complete emancipation of all slaves probably played a negative role.

To the Southern States, it appeared that the Northern abolitionists were imitating the British enemy, using "anti-slavery as a mask of righteousness in assuming commercial and ideological domination of the world" (Davis 2006: 286). We have to recognise that the same fears prevail today in many developing countries who often see efforts to regulate climate change as a way to limit their economic growth and put an end to their aspiration to live more comfortable, Western-inspired, lives. We have to demonstrate that our extravagant way of life is morally wrong, and that the only way to tackle problems such as scarce resources and man-made Climate Change, without reducing the rest of the world to abject poverty and starvation, has to entail a massive transfer of wealth (Henson 2006).

As we have seen in the first part of this article, the abolition of slavery and the transition to a fossil fuel economy was also facilitated by the general belief that technical progress would make life easier for people. By contrast, as recent sociological research has shown, the 'doom and gloom' discourse, often heard amongst environmentalists, can become counter-productive (O'Neill and Nicholson-Cole 2009; Moser and Dilling 2007). Such warnings are necessary to convince or remind people of the dangers of climate change, but they should be balanced by a more positive message. We can again draw on history for this message by emphasizing some positive aspects of the pre-fossil fuel society, or by reminding ourselves that the future is not written. It is true that excessive optimism about technology has sometimes prevailed. Some thought in the 1950s that nuclear energy would be so cheap that it would not need to be metered and that it would power spaceships to Mars. Yet, many technological inventions were unforeseen or judged entirely improbable. For a long time most engineers believed that steamships (and later, planes) would not be able to carry enough fuel to cross the Atlantic; many could not believe either that the concept of the filament light bulb would ever work (Smil 1995).

Similarly, it is important, in order to prevent hasty moral condemnation, to be reminded of the reasons why people chose to adopt fossil fuel based machines, and the economic and moral progress that they initially brought. In 1518 Bartolomé de las Casas, a zealous defender of American Indian rights, made the same mistake that advocates of steam power would later make. Recognizing that it would be very difficult to save Native Americans if an alternative workforce was not provided for colonists, he called for large importations of African slaves. Only later would he come to realise the implications of what he had called for, and he raised his voice again asking for the end of the slave trade. Likewise, we have only recently fully recognised the effects and the harm caused by what has, in effect, substituted slaves: fossil fuel powered machines. How better to illustrate that the road to hell is often paved with good intentions?

The trap into which we have fallen is vividly illustrated by a story reported by environmental campaigner George Monbiot. Monbiot compares the power given to us by oil to the power given to Faust by the devil in Christopher Marlowe's story (Monbiot 2006). The magical power which enabled Faust to travel on his "flying chariot" and to eat grapes in the middle of the winter is what causes his ultimate damnation. Our abundant energy gives us an extraordinary power. As McNeill puts it "with our new powers we banished some historical constraints on health and population, food production, energy use, and consumption generally. Few who know anything about life with these constraints regret their passing" (McNeill 2000: 362). However, we should never forget two things. First: power corrupts. Second: if energy is indispensable to our modern life, research has shown that happiness is not linked to levels of consumptions (Offer 2006; Fouquet 2008). In other words, we could be as happy and healthy while consuming a lot less.

If we do not change, we, and our children, will pay heavily for the consequences of our reckless activity. Moreover, future generations will look back at us in a few years' time and, with the "enormous condescension of posterity" (Thompson 1963), will wonder how our civilisation could have been so backward and live in such appalling moral blindness. As the ante-bellum orator Tarbox noted in 1843 "errors that slumber peacefully through one age, may be instantly detected in the next, because

they are looked at from other points of observation" (quoted in Davidson 2008). Will the next generation see that industrialised societies had mitigating circumstances? That until relatively recently, we did not know the devastating consequences of our actions? That the vast majority genuinely thought fossil fuels were improving the lives of most people on the planet? That we were also suffering ourselves from the fossil fuel bonanza or 'affluenza', through obesity, pollution, loneliness, damage to the social fabric of society, and that we had become surreptitiously addicted to the substance? Probably not. They are more likely to curse us for the irreparable damage we have done to the planet. Surely, they will say, these were a barbarian people.

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