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# Learning to Love the Landscapes of Carbon-Neutrality

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## **Abstract**

Landscape changes often provoke controversy, and yet may produce outcomes which become accepted and valued after a period of time. This essay proposes that society's increasingly earnest pursuit of sustainable development will involve landscape changes that attract protest and opposition, and which may prove a barrier to the rapid adjustments necessary to substantially reduce our carbon footprint. It considers this possibility by exploring two aspects. First, it considers the role of 'drivers' of change, and suggests that significant loss of traditional landscapes is inevitable, as the drivers that produced them are often becoming obsolete. Energy is likely to be a major driver of new landscapes as society seeks ways of weaning itself off fossil carbon fuels. The effects of this shift will be far-reaching, not only arising from energy production technologies, but also from the ripple effects of the energy 'life cycle'. Second, reference is made to the notion of the 'acquired aesthetic', which might suggest the capacity to develop a taste for emerging landscapes if we endorse their underlying story. The essay therefore raises the possibility that, by emphasising the underlying narrative of ingenuity in rising to the challenge of sustainable development, we can learn to see beauty and attractiveness in emerging landscapes of carbon neutrality.

## **Keywords**

Sustainability Acquired aesthetic Drivers of change Cultural landscape Carbon neutrality

## **Introduction**

This essay is about the type of landscape that might emerge as society finally grasps the nettle of dramatically reducing its energy profligacy and dependence on fossil fuels. It explores two main aspects, namely: the types of physical landscape change that might arise throughout the life-cycles of new energy technologies; and the level to which such changes may or may not be deemed acceptable. It acknowledges that there is likely to be a dynamic relationship between these two aspects.

As has been noted elsewhere (e.g. Bird Life International, 2005), new technologies of energy production must be combined with measures to increase energy efficiency and curb energy demand in a context of coherent policies to tackle climate change. Hence, this essay considers the shift towards ‘carbon-neutral’ approaches generally, and not just modes of energy production. ‘Carbon neutrality’ is potentially a confusing term, as some of the technologies specifically involve carbon accumulation through biomass production, but it commonly refers to radically reduced consumption of fossil carbon and emission of greenhouse gases, to the extent that human habitats could even become energy sinks (e.g. Forum For the Future, 2008). Such a transformation implies three things: minimising the use of fossil carbon in energy production; reducing our use of carbon-based energy in traffic movements, construction, manufacture and, not least, energy utilities and transmission networks themselves; and offsetting carbon footprints through planting sufficient biomass (usually trees) to neutralise residual CO<sub>2</sub> emissions. Many of these shifts are capable of producing visual controversy as well as ‘associative’ landscape objections such as loss of tranquillity and disruption to bird flight.

It is widely acknowledged that, in order to make any significant dent into the problem of global warming, changes to energy production and use need to be on a massive scale: substantial landscape transformation will be almost inevitable. Landscape change often proves controversial, as familiar and often cherished scenery is disrupted by new technologies and their ramifications. Paradoxically, as we pursue carbon-neutral living, it is possible that landscape and energy arguments will be pitched against each other, both in the name of sustainability.

This poses a major potential problem. There is perhaps a cosy and naive assumption that the pursuit of sustainability and low-impact living will be visually benign and readily embraced. Unfortunately, this is unlikely to be the case as energy is so fundamental to liveability and work that it invariably proves a transformative landscape ‘driver’ in both obvious and subtle ways. Figure 1 gives an idealised indication of an imaginary, but credible, future cultural landscape in which fossil fuel is used parsimoniously. As will become clear from the following discussion, all of its elements – not only those associated with electricity production – are affected by strategies for carbon neutrality.

Yet it is possible that landscape tastes will prove dynamic, so that new ‘energy’ landscapes will gain social approval if viewers are able to infer from their visual cues a collective quest for sustainability. This implies that tastes, values and preferences for landscape can change over time, and that they in some way

draw upon underlying stories or narratives. The contrary view is that landscape tastes are ‘hard-wired’ within us, deriving from the brain’s ability to perceive affordances in evolutionary environments; at the other extreme is the phenomenological claim that landscape preferences are cultural rather than biological. The balance of probability is that both factors are at play: Bourassa’s (1991) quadripartite explanation provides insight into the possible determinants, namely, a prerequisite (biological) element, a culturally acquired element, a more nuanced personally acquired element, and bias and prejudice elements arising from random experiences and associations. This essay considers the life-cycle effects of energy as drivers of future cultural landscapes, and reflects on whether their changes will be opposed by society because of their sensory impact or be celebrated because viewers endorse their semiotics of sustainability.

### ***The Fluidity of Landscape Tastes***

Human beings appear to appreciate landscapes for reasons of both aesthetics and familiarity. This essay particularly considers the more developed regions and their heavily modified landscapes rather than relatively pristine areas where human impact has been minimal. It thus emphasises places that have been profoundly altered by centuries or even millennia of occupation, clearance, drainage, exploitation and ornament. Some of these landscapes possess a widely acknowledged beauty deriving from qualities such as scale and harmony, often having a hand-built appearance and possessing intricacy and complementarity of linear and spatial elements. For such landscapes, there appears to be an extensive and intuitive admiration, and a growing tendency to formally protect them as valued components of our heritage (e.g. Phillips, 2002). Most landscapes are unexceptional, however, and do not fall into these favoured categories, yet they may still be cherished locally. The European Landscape Convention (Council of Europe, 2000) is a staunch ally of the ordinary and quotidian. Some warts-and-all landscapes are especially highly prized by ‘insiders’ and may, by virtue of association or familiarity, be fiercely defended by locals. Thus, ‘eyesores’ such as the recently demolished cooling towers at Tinsley (Sheffield), ‘Wigan Alps’ (coal shale tips) and the Walney Channel slag bank (all in the North of England) have locally acquired an iconic landscape status. Further, some scenery which once evoked scorn is now widely acclaimed. For example, Walker and Salt (2006) note how the Florida Governor in 1906, referring to the Everglades, vowed to wring the last drop of water out of that ‘abominable pestilence-ridden swamp’ (p19). Similarly, many parts of the English Fenlands are now conserved for or being restored to nature, yet former agricultural improvers’ disdain for their worthless state are reflected in John Perry’s 1725 drainage proposals to alleviate their ‘general distressed conditions’ (Perry, 1724).

This tendency for some objects to become fashionable over time or be valued by particular groups is not limited to landscape, but applies to anything – artworks, musical compositions, buildings, furniture, etc. – that can possess ‘aesthetic’ properties. Bourdieu’s writings are a particularly rich insight into why

particular artefacts and modes of behaviour become fashionable – developing an ‘acquired aesthetic’ – whilst others are deemed impolite (e.g. Bourdieu, 1984). This process of acquisition is generally quite slow, and may take a generation or two to adapt, perhaps when the hardships, shocks and injustices associated with the original context have been forgotten. We may also reflect on the likelihood that ‘polite’ values are often determined by an elite, and hence the need for measures to ‘democratise’ judgments about landscape.

Thus, whilst some landscapes appear to be spontaneously and widely favoured, many are an ‘acquired taste’. Some which are loved by insiders may, in fact, be disliked or feared by outsiders who neither feel comfortable navigating them nor appreciate their special meanings. The fact that most of us cherish some unremarkable areas of landscape arises because of what they signify to us, and also because we may have ‘learnt’, formally or informally, that they are valuable. Sometimes we value landscapes because of pleasurable associations such as recreation or social activities; sometimes it may be because of memories of camaraderie during times of adversity. Thus, the notion that certain landscapes reflect ‘good taste’ derives partly from values attached to them by particular communities of place and interest. The social production of taste associated with landscape is quite slow, and preferences tend to be conservative, generally making it difficult for us to accept change.

### ***Landscape and the Underlying Narrative***

A core theme of landscape research has been to understand the narratives underlying the visual canvas of scenery (e.g. Robertson and Richards, 2003). Phenomenological approaches have sought to interpret hidden meanings, stories, memories and associative values which insiders and outsiders can decode. Williams (1973) has classically analysed how images of the ‘country’ have conveyed stories such as reverence, innocence, hardship, moral virtue, dispossession, industry and indolence, improvement, decay, community and wistfulness. These frequently come laden with values, constructed by influential strata of society. In a similar vein, we can suggest that certain landscapes acquire a degree of politeness, leading to moral and political endorsement. The likelihood that we subconsciously infer from a landscape more than meets the eye (Countryside Agency, 2004) is reinforced by Rogge et al’s (2007) recent findings about responses to agricultural landscapes displayed by different user groups.

Carlson (2007) has developed our understanding of how environmental aesthetics can lead us to appreciate landscapes either by ‘engagement’ with them through multi-sensory immersion and/or by a more cognitive understanding of them as objects of beauty. When brought together, they enable both feeling and knowing, and this can yield a very deep appreciation of the aesthetic. He suggests that landscapes which have developed organically in relation to human needs are seen as having a ‘functional fit, in which nature and culture share a parallel necessity – the result is that such landscapes possess an

aesthetic because they ‘look as they should’. In a complementary manner, Iverson Nassauer (1997) suggests that we are not only deeply attached to ‘beautiful’ landscapes, but also that we strongly endorse ‘attractive’ landscapes and adopt conventions for their appearance and maintenance. Whilst the former conform to aesthetic conventions for the scenic, the latter tend to conform to aesthetic conventions for care. She argues that our care for such landscapes has often been excessively tidy and that a less manipulative and more ecologically based ‘intelligent care’ should be practised. This would require us to modify our aesthetic conventions so that we gave visual pre-eminence to features that reflect underlying functionality. Thus, through a more informed understanding of ecological and hydrological function, for example, we may acquire an attachment to new forms of landscape which hitherto might have been dismissed as untidy, hazardous and un-manicured. In different ways, both Carlson and Nassauer propose that landscapes which are perceived to possess ‘fitness’ may be deemed beautiful or attractive: there are reasonable grounds to suppose that we ‘learn to love’ landscapes when we understand the cogency of their underlying narrative. In the 21<sup>st</sup> century a dominant storyline will relate to ecological functionality and energetic parsimony.

Cultural landscapes are essentially a palimpsest portraying traces of successive periods of occupation and transformation. Phases of landscape development are ‘driven’ (e.g. Piorr, 2003; Schneeburger et al, 2007) by contemporaneous economic and social processes, including an increasing ability to override environmental constraints. These transformations have affected landscapes since the Palaeolithic, but have accelerated over the past three centuries by a succession of agricultural, manufacturing and communication revolutions. Generally speaking, changes which have been relatively slow and have worked with the grain of the land by creating human-scale structures and using local materials have become accepted and valued over time, even though they may initially have met with protest. More recently, changes of great speed and magnitude have attracted opposition: drivers such as the EU Common Agricultural Policy, car dependency and low-density housing are rapidly re-writing the story of the earth’s surface, sometimes disrespectfully obliterating previous landscape stories. In truth, some observers have perceived a modernist beauty in their simplicity and labour efficiency, but environmental imperatives now declare that they may achieve little more than their ‘fifteen minutes of fame’.

‘Cultural’ landscapes are produced partly by natural processes and partly by human drivers, and many have derived from a ‘virtuous circle’ of endogenously driven, embedded socio-economic activity which draws upon and in turn reinforces local landscape ‘services’ (Selman, 2007). A widespread problem is that the drivers which produced our distinctive heritage are increasingly obsolete, yet contemporary drivers do not seem to be creating landscapes which are intuitively pleasing or characteristically place-sensitive. The dominant drivers are typically exogenous in origin and their landscapes reflect the material representations of corporate values. Hence there is well-informed protest against loss of character and distinctiveness. The new landscapes tell only confused, mercenary or atomistic stories. In response, we often cling to an imagined past by relying on the fastidious embalming of set-pieces by the heritage

industry, and bankrolling farmers to maintain obsolete landscape features, both of which may prove transient expedients.

We may need to accept the demise of some of these traditional landscapes, and their gradual absorption into the palimpsest. Resistance to their loss may, it is suggested, be partly due to an underlying sense that their modern replacement landscapes convey a narrative of profligacy, greed, north-south division and vanity. It is quite possible that we could come to accept replacement cultural landscapes that possess a modern, but coherent and edifying new narrative that is coupled to contemporary social and economic realities – akin to Carlson’s ‘functional fit’. With the right combination of circumstances, we may be enabled to accept change and to value new landscapes because we can read and endorse their underlying story.

### ***The Impacts of Energy***

Energy has always been a driver of landscape change, from the very earliest stages of exploiting wood fuel or harnessing the power of flowing water – even, indeed, the practices of cultivation and domestication as ways of satisfying metabolic energy needs. Yet its transformative role has often been subtle and is only inferred indirectly from gradual changes in landscape pattern. For example, the 18<sup>th</sup> century agricultural improvers in England had no conception of the ways in which the functional and ornamental elements of their estates would cohere into a bocage landscape of strategic ecological significance – they were simply taking incremental steps to create local energetic efficiencies in farming regimes combined with intermittent schemes of beautification. We are likely to have similarly profound and unintended impacts on our landscape, and we need to be aware of the cumulative visual and functional consequences of our policies and practices. Consider, for example, human ecological analyses of agricultural energetics. Bayliss-Smith’s (1982) classic studies of traditional and modern farming systems included a contrast between a 460ha farm in Wiltshire, England, in the 1820s and 1970s. In the 1970s, this yielded 2,420MJ per farm worker per day – sixty times the figure for the 1820s. However, the equivalent energy ratios were less flattering, having fallen from 14 to 2.1 due to the inefficient energy chains and reliance on artificial energy subsidies. Strikingly, the food chains linking crops, animals and humans had become highly integrated into wider systems of food production and distribution leading to additional hidden energy use. These factors hint at the systemic and pervasive ways in which energy consumption and embodiment ramify through the landscape, and how equally sweeping transformations could ensue from changes in energy availability and curbs on its use. Energy required by agricultural systems has risen much faster than food output, and it is very possible that a new and legible narrative of energy efficiency might replace that of the single-minded pursuit of labour efficiency.

We may be about to witness the landscape reorganising itself around the energy driver, and this will have three basic expressions, namely:

- energy production – for example through biofuels, wind turbines and river regulation.
- energy consumption – particularly in relation to transport and space heating/cooling, which may reflect itself in compact or linear settlements to facilitate efficient movement, and buildings that touch more lightly on the earth.
- embodied energy – the energy implicit in the life-cycle of a product or practice, for example in our food miles or buildings.

The dominant metanarrative of the 21<sup>st</sup> century will be ‘sustainability’, and particularly our ability to reduce our carbon footprint. This is a story in which we can take pride and, arguably, ‘learn to love’ the associated landscape transformation.

### **Energy Production as a Landscape Driver**

Energy production has driven the emergence of distinctive landscapes throughout history, and traditional sites of wind and water power are often important parts of heritage. It is doubtful, though, whether they would have been considered ‘attractive’ in their heyday. For example, the city of Sheffield, by the mid-18<sup>th</sup> century, had become the most extensive user of water power in Britain and probably Europe; whilst to the immediate west, in the Peak District, scores of textile, paper, wire and other mills were established. Such harnessing of kinetic energy, and its physical ramifications through the landscape, produced extensive visual and aural disruption, as well as pollution and excavation. Now, the grindstones, looms and forge-hammers have fallen silent, artefacts are preserved as heritage, and many mills which even quite recently were deemed problematic eyesores have been converted to luxury apartments. The landscape relics of energy conversion are now regarded as picturesque (Figure 2). Maskit (2007) has defined the landscape attraction of post-industrial sites as ‘interesting’ rather than necessarily possessing traditional qualities of beauty or sublimity. He particularly draws attention to Latz’s Landschaftspark Duisburg Nord in Germany’s Ruhr Valley in this regard, where incorporation of abandoned industrial structures leads, he argues, to aesthetic engagement through a process of ‘renovation’.

During the 19<sup>th</sup> and 20<sup>th</sup> centuries, industry became predominantly carbon based, first through coal (and some oil shales), and subsequently through oil and natural gas. In some cases the mines and their associated steam-powered mills were the cause of contemporary protest about landscape violation. Yet often this was quite muted, and the transformation of the earth’s surface was narrated as enterprising and progressive, so that societies displayed a widespread capacity to accept the smokestacks of early industrialisation. The response of the wealthy was not so much to prevent the despoliation, as to migrate to the more salubrious upwind side of cities. The social climate of the 20<sup>th</sup> century was one of brave new technologies, enabling us to electrify and industrialise the world and feed its exponentially growing

population. Hydro-power was seen as economic and clean, often bringing employment to remote regions, and the grandeur and boldness of its installations sometimes deliberately mimicked the sublime. Nuclear power was seen both as a symbol of technological triumph and an emblematic use of atoms for peace. The citadels had a certain iconic status in the landscape and were not necessarily viewed as antipathetic.

It is difficult now to appreciate the degree to which large-scale landscapes have been transformed, directly or indirectly, as a consequence of their role in energy production for a rapidly evolving industrial base. Nor can we readily comprehend the mixed emotions associated with enterprise, grimness, squalour, occupational illness, decay or gentrification that have influenced our perception and acceptance or rejection of them over time. What we can reasonably state, however, is that our reactions towards energy production landscapes have derived from a mixture of taste, shock and reason, tempered by the 'good' or 'bad' morality of the underlying narrative. Acceptance of them proved ambiguous and malleable, and is susceptible to change where the associations become more positive (e.g. sustainability) or negative (e.g. nuclear hazard).

Proposals for large scale generation facilities now routinely provoke opposition. One of the main controversial dimensions appears to be that of scale. A reason for this may be the overwhelming nature of modern installations that produce 'monocultural' landscapes, unremitting in their single purpose and ignoring the principles of harmony and fitness. Alternatively, it may be that the technological capability to construct and generate at such large scales has occurred during a period of increased environmental awareness and highly organised conservation groups. Consequently, the narrative revealed through the landscape is read as either one of brash and insensitive hubris, or one of doomed reliance on hazardous and unsustainable technical fixes and wasteful dissipation of power through distribution networks from centralised plants, both of which also require massive embodied energy.

Much of the literature on 'alternative' energy landscapes has centred on wind conversion, whose scales of transformation are widely attested and provoke mixed feelings (e.g. Ellis et al, 2007). If energy crops such as Miscanthus and short-rotation coppice gain momentum, their spatial extent could be remarkable – for example, a 10% substitution of petrol and diesel fuel could require 38% of the current cropland area of Europe (International Energy Authority, 2004). There have been concerns about their visual monotony and mixed effects on biodiversity, as well as on their displacement of more efficient carbon-sequestering landscape covers such as forests (Righelato and Spracklen, 2007). Suffice to observe that new landscapes of energy production are emerging which will probably be more extensive than anything previously seen. Reactions to their visual effects are currently varied, even polarised, but experience suggests that the paraphernalia of a wisely and democratically chosen energy path will become positively appreciated by association with the pursuit of socially endorsed goals. It is unlikely that they will be instantly liked, yet there is an emerging social consensus about their necessity, and this provides a basis on which a favoured narrative may be inferred from their visual cues.

### ***Energy Consumption as a Landscape Driver***

Consumption of energy has landscape scale effects in a number of ways, both through the permanent infrastructure required to channel energy to end-users and through the ephemeral qualities of landscape such as the production of energy crops and the sight and sound of moving vehicles. One of the most visible and durable influences is that of electrification, whose infrastructure is rarely celebrated. Some have seen beauty in lines of pylons, not least through their signification of progress and human triumph. Nowadays, pylons are amongst our least loved industrial artefacts, yet they epitomise society's voracious consumption of electricity and desire for its flexibility. Landscape assessments typically point to their ugliness, intrusiveness, scale, discordant lines and tendency to bisect landscapes, compounded by the alleged unseen 'story' of radiation.

Domestic energy supply has liberated us from the need for climatically appropriate housing, but it now seems certain that reducing domestic fuel consumption will become a major driver of the built landscape. As Oktay (2002) notes, each region has traditionally produced its own cultural patterns in response to climatic conditions, reflected in distinctive settlements and building forms. Indigenous (as opposed to colonially influenced) traditional architecture has tended to be climatically appropriate, giving protection from sun and heat in some climates and defence against wind and rain in others, whilst widespread use of stone took advantage of its ability to support the storage of solar energy. Settlements evolved in both planned and organic ways to optimise solar benefits through building shapes, aspect, street orientations, and solar access to buildings and outdoor public places. Our response to contemporary settlement planning has often been to prescribe 'neo-vernacular' design of buildings to preserve a sense of place. However, this has tended to produce a purely visual effect rather than to emulate their attunement to climate or energy efficiency. The resultant townscape has thus often resulted in an unconvincing pastiche. It is entirely probable that this postmodern narrative will in future be seen as insincere and that greater integrity will attach to sympathetic but unashamedly new vernacular styles based on carbon neutrality (Countryside Agency, 2004) (Table 1). An illustration of possible change is provided by the approval of previously 'heretical' Roundhouse by the Pembrokeshire Coast National Park in September 2008 (Figure 3): almost required to be demolished by the planning authority, it is now officially endorsed by their low impact development policy and could come to be viewed as an appropriate and sympathetic element in the National Park landscape.

Table 1 near here

Transport is a major consumer of energy across its linear features and hubs of interchange, as well as in the location and form of settlements. Ancient routes such as salt-ways and transhumance tracks have contributed significantly to Europe's culture, as have some canals, navigable rivers and railways. Whilst the construction of water and iron 'navigations' would have been noisy and disruptive, and sometimes

drew protest from wealthy landowners, they have now mellowed into the landscape and generally possess positive associations. It is the infrastructure associated with motor vehicles, however, that has most pervasively transformed the landscape. At first, the ribbons of tarmac and their associated paraphernalia of service stations and street furniture frequently evoked curiosity and affection. When England's first stretch of motorway opened in 1959, the transport minister hailed it as "magnificent ... opening up a new era in road travel, in keeping with the new, exciting, scientific age in which we live" and Pathé newsreels eulogised it as "safe, fast and beautiful", stating "this is the motoring we used to dream about" (cited in Moran, 2006). Half a century on, motorways are rarely considered beautiful and their service stations are amongst the ugliest additions to our countryside.

Some still see them as valuable landscapes in their own right, both actual and potential. The British architect Will Alsop, admittedly using inventive imagination, has proposed a SuperCity on a 25km-wide strip running the length of the M62, as a sprawling but allegedly beautiful landscape alternative to traditional free standing towns and cities. The M1 has also been considered as Britain's most important piece of land art. The wider consensus, though, is that the freeway landscape is a 20<sup>th</sup> century anachronism and will therefore probably not be a major driver of future landscapes. Righelato and Spraklen's (2007) assessment of the scope for biofuels in transport is bleak, and they conclude emphatically that 'for the longer term, carbon-free transport fuel, technologies are needed'. The consequences of such different transportation energetics could well transform landscape appearance and functionality.

### ***Embodied Energy as a Landscape Driver***

Few observers are aware of the degree to which the appearance of cultural landscapes reflects their embodied energy. This, though, is perhaps the main producer of both 'hard' and 'soft' features of the cultural landscape – i.e. buildings and other structures, and planted corridors and patches. Embodied energy content is a significant component of the lifecycle impact of the 'hard' landscape and can be equivalent to several years of a building's operational energy. Thus, the landscape of carbon-neutrality will be strongly associated with careful choice of construction materials, and with subsequent renovation and maintenance. Most vernacular buildings were probably highly efficient in terms of embodied energy, having used natural materials from relatively local sources, transported mainly by animals and constructed by human effort; they also often proved to be adaptable and durable. The modern urban landscape increasingly reflects high levels of embodied energy through the transport of materials and other 'upstream' factors, and the reliance on manufactured materials which possess demanding technical properties. As buildings become more efficient in terms of energy consumption, so the proportion of a building's life cycle carbon budget associated with embodied energy increases. It is possible that many acclaimed new buildings now celebrated for their energy efficiency will in the future be seen as profligate in terms of total carbon consumption, leading to marked changes in materials and designEqually, given

the importance of longevity and durability in reducing life cycle embodied energy, our ‘big shed’ edge cities may be unquiet reminders of a throwaway society that was incapable of seeing beyond the next generation. This is not a straightforward issue, however, as the ability to dismantle, recover and reuse building components can lead to efficiency in embodied energy, so that temporary exurbs may have their virtues. In the built environment, embodied energy is also closely associated with drainage and other infrastructure systems. Installing and maintaining this is highly energy intensive, and it is likely that more naturalistic greenspace networks and sustainable drainage systems will be defining features of future townscapes.

In rural areas, the embodied energy of agriculture is expressed through field boundaries, farm buildings and land cover (including land colour, with most of our farmland appearing unnaturally green, for example). A singularly unseen factor is the amount of energy which has been invested in lowering water tables to enable more intensive year-round farming. Indeed, we take-for-granted both the dryness of agricultural landscapes and the land cover, machinery and animal breeds they support. This embodiment of energy insidiously alters countryside to an unimagined degree and transforms the expression of cultural landscapes at continental scales. If, in future, less energy is to be embodied in structures such as coastal defences, ‘concrete overcoats’ for rivers, super-efficient field drains, and urban ‘grey infrastructure’ then transformation of landscapes by extensive re-wetting is likely. Referring to the practice of urban landscape design, Joyce (2008) reminds us about the need to consider the embodied energy of soft landscape components, with far-reaching implications for climatically appropriate species selection, maintenance regimes, drainage systems and plant production.

### ***Can we Learn to Love the New Landscapes?***

Energy, in various forms, has always been a driver of cultural landscapes, and it has driven landscapes which are loved and loathed in different ways at different times. In the 21<sup>st</sup> century energy, both implicitly and explicitly, is likely to drive new landscapes, probably at a faster pace than our aesthetic adaptation will permit us readily to accept. We have a contemporary myth that sustainable development will be synonymous with cosy farming practices, mellow building styles and graceful local energy production. This is probably grossly naïve. The production, distribution, consumption and embodiment of energy for a world which supports perhaps nine billion people is unlikely to be so Arcadian. The implications may seem benign, but many of the outcomes will be industrial in scale and visually heretical. Yet there are possibly some broad principles that can make change more gracious: mass produced solutions and developments that are insensitive to local need and character will probably be less acceptable than those which have some demonstrable link to place and are designed to complement local environmental services. Neighbourhoods will want to know that ‘their’ windfarm or reedbed filtration system is helping them to lead more sustainable lives and make a contribution to wider social goals.

Thus, it is plausible that we learn to love landscapes in which we can read stories of endeavour, solidarity, enterprise, community and purpose. The dominant policy narrative is now that of sustainable development, including a drive for carbon-neutrality. We appear to prefer cultural landscapes which can be read as familiar and coherent texts. Although at times heretical and contested, new energy landscapes can display placeness and tell a story of human ingenuity, adaptation and wisdom that is intrinsically worthy of pride.

It is very likely that rapid change, however essential, will evoke protest. Yet if it is associated with an urgent response to global warming and human need, it has the potential not only to become 'loved', but also to continue the tradition of cultural urban and agricultural landscapes whose embodied energy reflects a close association with climate. They may show profound continuity with the past, and provide a unifying and democratic narrative for the future. Even though some of the agricultural paraphernalia, housing styles and land drainage of carbon-neutral living may be at variance with polite but malleable tastes, they may also be perceived as having a compelling storyline which resonates with people's underlying values. There are clearly problems in acquiring tastes against an insistent timetable, and in reaching decisions about the relative validity of competing sustainability arguments. It is important, therefore, that attention turns to the democratisation of landscape choices through the use of increasingly well tested practices such as deliberative mapping and social/ sustainability learning (e.g. Burgess et al, 2007, Petts, 2007, Blackmore et al, 2007, Tàbara and Pahl-Wostl, 2007). Indeed, the landscape presents a powerful milieu of experience and engagement for the use of such approaches.

In sum, energy will be a driving force of future cultural landscapes. It will express itself through production, consumption and embodiment in innumerable ways, both obvious and subtle. We need urgently to respond to the imperative of carbon-neutrality. This will create apparent conflicts with both 'finest' and ordinary landscapes, and will risk intensifying the placelessness of corporate late modernity. Yet the pursuit of sustainable development in an informed and democratic way can produce landscapes that people celebrate because they endorse their underlying narrative. Our acceptance of the landscape consequences of a carbon-neutral society needs to be well-informed so that we make difficult but wise choices rather than oppose necessary changes in buildings, infrastructure and countryside. Our heads accept the need for these landscape changes; our hearts need to 'learn to love' them.

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