Sustainability **2013**, *5*, 3526-3542; doi:10.3390/su5083526

OPEN ACCESS

sustainability

ISSN 2071-1050

www.mdpi.com/journal/sustainability

Article

"Bring It under the Legacy Umbrella": Olympic Host Cities and the Changing Fortunes of the Sustainability Agenda

John R. Gold [1,*,†] and Margaret M. Gold [2,†]

[1] Department of Social Sciences, Oxford Brookes University, Gipsy Lane, Headington, Oxford, OX3 0BP, UK

[2] London Metropolitan Business School, London Metropolitan University, 277-281 Holloway Road, London N7 8HN, UK; E-Mail: m.gold@londonmet.ac.uk

† These authors contributed equally to this work.

* Author to whom correspondence should be addressed; E-Mail: jrgold@brookes.ac.uk; Tel.: +44-1865-48-3787; Fax: +44-1865-48-3787.

Received: 28 June 2013; in revised form: 8 August 2013 / Accepted: 12 August 2013 / Published: 16 August 2013

Abstract: A concern for enduring urban outcomes lies at the heart of the Olympic Games in a way that no other sporting or cultural event can match, but each age has recast the ways in which such outcomes have been framed in light of its own values and needs. Seen against that background, this paper examines the evolution of the Olympic movement's sustainability agenda. It first considers how the environment emerged as an issue within the Winter Games through concerns over environmental protection, discusses measures introduced to embed sustainability into official Olympic practice, and explores the evolution of the dynamic relationship between sustainability and the overlapping but, to some extent, rival concept of "legacy". The latter part of the paper illustrates these ideas with regard to the London 2012 Summer Olympic and Paralympic Games. It analyses the "One Planet Games" concept, how this was developed for the bid, and how it was subsequently put into practice, commenting particularly on the carbon footprint, creation of the Olympic Park (as sustainable legacy) and the promotion of sustainable living. The conclusion comments on the continuing challenges encountered in implementing sustainability plans and addressing long-term legacy.

Keywords: Olympics; sustainability; legacy; Olympic Charter; London 2012

---

1. Introduction

An unexpected but nevertheless welcome occurrence in 2012 was the injection of an element of humour into the normally solemn territory of Olympism—the abiding *ad hoc* humanist philosophy that surrounds the Olympic Games. It was an integral part of the Opening Ceremony with the Mr Bean and the James Bond sketches, but it was also present in a beautifully crafted comedy series entitled *Twenty Twelve*, which was broadcast on British television in the months immediately prior to the Games. The series concerned office politics within the fictional "Olympic Deliverance Commission" (ODC)—itself loosely based on London's Olympic Delivery Authority—and had a habit of lampooning points of indecision, pomposity, confusion or contestation that were uncannily close to those observed in the real world. A notable instance came with the narrative that concerned the treatment of legacy and sustainability. From the outset, the ODC had had a Head of Department with responsibility for "sustainability", but an episode half-way through the series saw the appointment and arrival of a new and rival departmental Head with an overlapping responsibility for "legacy" [1]. Henceforth, to the intense annoyance of the Head of Sustainability, any territorial dispute about responsibility for a significant new problem or issue was casually greeted with the statement "bring it under the legacy umbrella". In the process, the Head of Sustainability essentially found herself demoted; dealing with seemingly technical matters such as building standards and carbon footprints and sidelined from key decision-making.

Although expressed humorously, this story-line offered insight into a trend that was readily observable as the London 2012 project unfolded. Legacy and sustainability were regarded as broadly co-equal in their significance when the business of crafting a bid for the Games of the XXXth Olympiad began in 2003, but the balance steadily shifted as the Olympic Park and venues began to take shape. For London 2012—as for other recently-held and forthcoming Games—it has been legacy, however defined, that has assumed precedence in thinking about the outcomes of the Olympics. By contrast, while sustainability has retained a key place in the requirements that the Olympic movement places on host cities, debate about it no longer attracts the headlines. Indeed, proclamations about a forthcoming Olympics as being a "Green Games"—once the acme of ambition for their organizers—have been superseded by the rhetoric of legacy.

This paper proceeds against this background. The first of its three main sections provides historical context, showing how the Olympic movement and its host cities have long shared a concern that staging the Games should provide enduring beneficial consequences. After recognising the varying forms that this concern has taken, we note the rise of environment *per se* as an issue involving protection of fragile natural environments when staging the Winter Games and comment on the measures adopted by the International Olympic Committee (IOC) from the 1990s onwards that placed "environment" and, then, "legacy" at the heart of the Olympic movement. The second part discusses the crafting of a sustainability agenda for London 2012. It analyses the notion of a "One Planet Games" that was developed for London's bid and how it was subsequently put into practice, while at the same time recognising the uncomfortable relationship between sustainability and legacy provisions. The third part reflects on the lessons that can be drawn from London 2012's experience of implementing sustainability plans while addressing long-term Olympic legacy.

2. A Vehicle for Change

The concern for enduring outcomes, as mentioned above, has always lain at the heart of the Olympic Games; indeed, the reasons for their reintroduction in the 1890s rested on far more than a simple desire to recreate a classical event renowned for sporting excellence. Baron Pierre de Coubertin, the key figure within the group that re-established the modern Games, saw the potential of sport initially as a tool for national regeneration [2] and later in the context of "internationalism", the idealistic moral philosophy which upheld the notion of a community of interests or action shared between different nations [3]. Coubertin's group of *rénovateurs*, who became the core of the IOC, drew on the imaginative constructions of nineteenth century classical scholars to conceive the ancient Games romantically as a *panegyris*—a democratic and pan-artistic gathering of all the people. Adapted to a modern setting, the broad conception was that of a festival based on the twin pillars of "sport" and "culture" that was intended to bring the peoples of the world together. The connection with ancient Greece was explicit and vital to the identity of the Games but because the *rénovateurs* saw the Olympics as part of the general heritage of Western culture rather than belonging to the modern-day Greek state, they felt that the latter had no proprietorial claim over the Olympics. The Games were therefore free to be allocated to cities throughout the world that were deemed suitable to stage them.

This strategy effectively embedded the relationship between the Olympic movement and its host cities—along with their respective needs and desires—at the heart of the processes that would shape each ensuing Game [4]. As far as the early Games were concerned, the necessary bargaining proved straightforward. Given that the Olympics were relatively small and could be housed in existing or temporary stadia, the nascent IOC saw outcomes primarily in terms of the prestige of staging the Games and the inspiring influence of the Games and its ideals on the host society. The host city saw few economic benefits other than, perhaps, increased tourist revenues for the duration of the Games. Over time, new considerations emerged. For instance, the possibility of using the Olympics to propagate potent imagery of national identity, for example, profoundly influenced the Berlin Summer Games in 1936, although the impact on the city itself, other than provision of the extensive complex (the *Reichssportfeld*) that was constructed to house the Games venues, was relatively muted [5].

Things altered dramatically after the ending of the period of Austerity that followed the Second World War. Games organizers from Rome 1960 saw the opportunity to use the Olympics as a vehicle for change, integrating Games-related developments into broader urban planning; a strategy that saw host cities attach increasingly large exercises in areal regeneration or infrastructural renewal to the Olympic project. In doing so, an implicit understanding emerged between the Olympic movement and its host cities. The governing IOC recognised that the Summer Games in particular imposed heavy financial and logistic demands and were sensitive to critics' accusations that the seemingly unbridled expansion of the Olympic Games verged on gigantism [6]. Yet while willing to acquiesce in the organizers' desire to gain tangible compensation for the costs of staging the event, the IOC blanched at the trend that culminated in the situation seen at Barcelona 1992, where just 17 per cent of the funds earmarked for the Games were allocated to the sporting events and venues against the 83 per cent that funded physical planning projects perceived to be beneficial to the city [7].

It was therefore highly opportune, for the IOC at least, that two new agendas emerged during the next decade that boosted its negotiating position *vis-à-vis* the host cities. The first came through

anxieties about the Games' environmental impact. Concerns about the environment had long arisen over the Winter Games' impact on what were often fragile mountain environments. In March 1930 during the preparations for Lake Placid 1932, for example, a locally based action group called the Association for the Protection of the Adirondacks successfully brought legal action against the organizers over the proposed site for the bobsled run, arguing against it both on environmental grounds and because building on state land was unconstitutional. As a result, a compromise site was found at South Meadows Mountain, later renamed Mount Van Hoevenberg [8]. Four decades later, local opposition to plans for the 1976 Winter Games in Denver culminated in a referendum in the state of Colorado. Mindful perhaps of the serious financial and environmental problems that had accompanied the recent Winter Games at Grenoble 1968 ([9], p. 1904), the vote of more than 60 per cent against the proposed Olympic effectively cut off the organizers' access to state and federal funding and thereby led to Denver withdrawing its candidacy [10]. Even the Summer Games—long imbued with a narrative that associated opposition to Games-related improvements as anti-progress—witnessed criticism of environmental impact, for instance, as with the destruction of important cultural heritage sites at Seoul 1988 [11].

At the turn of the 1990s, concerns about protection of natural and, to a lesser extent, cultural environments began to transmogrify into a movement towards achieving sustainability. Perhaps the key influence in this respect was the Brundtland Report's notion of sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" [12]. To some extent, this notion would always have appealed to the idealism that remains a potent force within the Olympic movement, but it was given added impetus through the involvement of Gro Harlem Brundtland, then the Norwegian Prime Minister, in Lillehammer's successful bid for the 1994 Winter Games. While the idea of a "Green Games" had not originally been part of Lillehammer's rationale [13], Brundtland's presentation to the 1988 IOC Meeting in Seoul included a call for "an ethic of solidarity with our current and future generations, a responsibility to the global balance of nature and an understanding of our role within it" [14] Once Lillehammer's unexpected victory was confirmed—it had previously come only fourth in the voting for the 1992 Winter Olympics that was won by Albertville—the Norwegian Government made the event a showcase for its environmental policies. The bid's objectives were expanded to include five "green goals" that moved thinking on from simply protecting the environment towards a proactive view of sustainable development. Pursuit of these goals directed the Organizing Committee "to increase international awareness of ecological questions; to safeguard and develop the region's environmental qualities; to contribute to economic development and sustainable growth; to adapt the architecture and land use to the topology of the landscape; and to protect the quality of the environment and of life during the games" ([15], p. 1892).

Lillehammer 1994 presaged a variety of initiatives, not always completely integrated, that directly addressed the environmental impact of the Olympics and saw progress towards accepting a commitment to achieving greater sustainability [16,17]. Driven by the continuing criticism over the burgeoning scale of the Olympics and also perhaps chastened by an acquiescent embrace of commercialism in the 1980s and 1990s ([18], p. 2077), the IOC added the requirement that the Olympic Games should be "held in conditions which demonstrate a responsible concern for environmental issues" to the Olympic Charter in 1991 [19]. The IOC went further and embraced the

environment as the third pillar of Olympism along with sport and culture at its Centenary Congress in 1994 and the Olympic Charter was further amended in 1996 to commit the movement to "sustainable development" [20]. Thus the Olympic movement sought to promote sustainable practice, positive action and changed attitudes within the whole sporting community within the context of Olympism [21].

Principles derived from the 1992 Rio Earth Summit also found resonant echoes in the dealings between the IOC and the host cities. In 1994, future candidate cities had to show how their proposals addressed the goal of sustainability, with the IOC's own Agenda 21 document introduced in 1999. By this time, too, the hosts for Sydney 2000 were also looking to create a "Green Games". The original bid document, for example, had stated commitment to "energy conservation and use of renewable energy sources; water conservation; waste avoidance and minimization; protecting human health with appropriate standards of air, water and soil quality; [and] protecting significant natural and cultural environments" ([22], p. 346). In due course, the Olympic Park at Homebush Bay would win extensive contemporaneous praise—although rather less since – for its environmentalist credentials [23].

The emergent emphasis on sustainability was formalised in the criteria used for the Olympic Games Global Impact (OGGI) programme [24], which the IOC introduced in 2003 and which was renamed the Olympic Games Impact Study in 2007. The programme specified around 150 indicators, broken down into three categories: economic, environmental and social. Using these indicators, host cities would produce a sequence of four reports at intervals over a period of 12 years in order to enhance the supply of information about impact. The reports are required at the time when a city's official Olympic candidacy is announced by its National Olympic Committee (Baseline Report), during the preparation phase, one year after the Games and, finally, three years after end.

It would be an oversimplification, however, to see the advent of OGGI purely in light of thinking about sustainability. At much the same time, another agenda was developing in the shape of *legacy*, which would rival and surpass sustainability as the guiding framework for considering urban outcomes. Best understood as being as something passed from one generation to the next although not necessarily purposefully (as with a bequest in a will), legacy was always a loosely defined and all-embracing concept. A seminar organized by the IOC in 2002 defined it as having:

> many aspects and dimensions, ranging from the more commonly recognised aspects—architecture, urban planning, city marketing, sports infrastructures, economic and tourist development—to others…. that are less well recognised… the so called intangible legacies, such as production of ideas and cultural values, intercultural and non-exclusionary experiences… popular memory, education, archives, collective effort and voluntarism, new sport practitioners … experience and know-how [25].

The permissive looseness of this definition allowed legacy to become a notion that was sufficiently flexible to provide an all-inclusive framework that was able to embrace, with equal facility, outcomes that could be tangible and intangible, planned and unplanned, direct and indirect, short- and long-term, and positive and negative [26,27]. In 2003, the Olympic Charter was amended to require the IOC to take measures to "promote a positive legacy from the Olympic Games to the host city and the host country" [28]. Cities now had to show not just that their proposals would have sustainable consequences but also that they would leave a positive legacy. Yet "legacy" perforce suffers from the characteristics of most comprehensive notions, especially in terms of being vague, easily manipulated

to suit different ideologies and, in the case of the Olympics, to fit into different meta-narratives of urban development. Moreover while legacy and sustainability remain distinct entities in Olympic terminology there are substantial areas of overlap with legacy looking to be sustainable in social, economic or environmental terms and sustainability aiming to leave a legacy in terms of on-going attitudes and behaviours. The two concepts act as filters for visions of post Games transformation or those urban areas most affected by the Games. The tensions between these notions and the ways that these tensions have been resolved are amply demonstrated by the example of London 2012.

3. The One Planet Games

This then was the context for London 2012; one of the first bids to be constructed with the new sustainability and legacy agendas firmly in place. When preparing their bid, the London team crafted a multi-stranded narrative that blended economic, social and environmental arguments together into a powerful and highly persuasive selling message [29]. Recognising the IOC's preference for a nucleated Olympic Park, the bid committee proposed concentrating the main cluster of venues into a 237-hectares (587 acres) site in the Lower Valley of the River Lea at Stratford in the east of the city. In theory, this area should have constituted prime development land given that it was located just 3–4 kilometres east of London's international financial heart in the City and 1.5 kilometres north of the mushrooming business districts in the former Docklands, but its decrepit physical condition had militated against its use. To elaborate, the Lower Lea Valley had for centuries been a dumping ground for London's more noxious waste and, as recently as the 1960s, had still played host to large-scale chemical plants, soap and glue manufacturers, leather tanneries, the Bryant and May match factory and the former Great Eastern locomotive works at Stratford. Polluted water-courses and extensive tracts of railway land threaded their way across the area. By the Millennium, much of the industry had disappeared, leaving large expanses of brownfield land in need of, but scarcely likely to receive, the considerable investment of funds necessary for its regeneration.

Admittedly, the resulting impression of a post-industrial wasteland that was widely circulated was based on an outsider's view of the area that was not tuned to recognising the undoubted complexities of its intimately configured social and economic structure [30]. No such thinking, however, was apparent; at least not until some years later. Rather, the putative bid team presented the Olympic project as an opportunity that was unlikely ever to be repeated; the chance to undertake the necessary land decontamination and environmental improvement of what seemed a *tabula rasa* as a by-product of staging a sporting mega-event. In doing so, a brownfield site near the heart of London set in amongst some of the most deprived areas—not just of London but in England as a whole—would be apparently be transformed for the good of all. This message, framed around the notion of a permanent and sustainable legacy, was crucial in selling the project, with all its implications for substantial public expenditure, to the British government in 2003.

At the point when the candidate file was submitted to the IOC in 2005, the London team had fine-tuned the proposals considerably. Legacy was everywhere to the fore, but there was also a fully-fledged sustainability agenda. The bid team worked with two voluntary sector environmental organizations: the internationally-constituted World Wildlife Fund (WWF); and the smaller United Kingdom (UK) based BioRegional, the latter founded in 1992, as a research and education

organization that would also promote the development of economically viable, sustainable products and services [31]. These two organizations had already developed the notion of a "One Planet Living Agenda" as a programme to promote sustainable living within the capacity of our single planet—not the three planets required if the world consumed natural resources at the rate of Britons and Europeans or the five planets that a North American lifestyle would require. One Planet Living is framed around ten principles: zero carbon; zero waste; sustainable transport; local and sustainable materials; local sustainable food; sustainable water; natural habitats and wildlife, culture and heritage; equity and fair trade; and health and happiness (see Table 1). WWF and BioRegional wanted to use the excitement of the Olympic Games to get across their environmental message to the wider public in London, the United Kingdom and globally. At the same time, their involvement potentially offered the London bid a distinctive environmental sobriquet that would differentiate it both from previous Olympics and from the competing cities for the 2012 Games, while providing a more than cosmetic sustainability agenda.

Once the bid was won, these ten principles were expressed in terms of five themes (climate change, waste, biodiversity, inclusion, health and well-being) and 12 sustainability objectives (carbon; transport and mobility; waste; water; materials; biodiversity and ecology; land, water, noise and air; inclusion; supporting communities; access; employment and business; health and wellbeing) (see Table 1). The Commission for Sustainable London 2012 (CSL) was set up as an independent monitoring organization to ensure targets were met—the first time that an autonomous system for monitoring of key stakeholders had been established for an Olympic project. It had the power to interrogate policy-makers, had access to documents, and produced annual and thematic reports which analysed progress and action against the sustainability principles and targets. It was also expected to play an advisory role to the Olympic Board. At the same time, the CSL developed its own sustainability legacy goals. As Table 1 shows, these combined environmental considerations (such as minimum impact on climate change) with prominent display of social sustainability and community goals, including improvements to housing, skills, health, sustainable lifestyles and disability inclusion.

The principle of having an independent assurance body was important in its own right, but equally it was decided that the CSL itself should be subject to scrutiny at the end of the Games period by consultants appointed for the purpose. Their findings were that the Olympic Delivery Authority (ODA) and the stakeholders judged CSL's contribution as "significant" in helping to embed sustainability within the governance and strategy of the Olympic project, in stopping sustainability from being ignored, in brokering solutions, and in playing a major role in role in ensuring that the knowledge and expertise developed by ODA and the London Organizing Committee for the Olympic Games (LOCOG) was captured and shared [32].

The legacy agenda for London was expressed in a series of Legacy Promises from the UK Government and from the Mayor of London (see Table 2). The Government embraced a national perspective, promising legacy in the fields of elite sport and sport participation, transforming East London and the Olympic Park, and showcasing the UK as a "creative, inclusive and welcoming place to live in, visit and for business" [33]. A promise to transform the lives of disabled people was added in 2009. The Mayor of London in 2008 promised a legacy of sport participation for Londoners as well as jobs, business and volunteering opportunities, the transformation of East London, the creation of sustainable communities, and presenting the world with a vision of London that was "diverse, inclusive, creative and welcoming" [34]. The new Coalition government (elected May 2010) modified

the national Legacy Promises in December 2010, cutting them down to just four in number and, noticeably, removing mentions of the word "sustainability". References to economic growth and regeneration now replaced phrases such as "sustainable living", "sustainable Games" and "sustainable communities" [35].

Table 1. Overview of sustainability themes.

One Planet Living Principles	London 2012 sustainability themes	ODA Sustainability Objectives	Commission for Sustainable London 2012: sustainable legacy
Zero carbon	Climate change	Carbon	A better standard of living for Londoners in the host boroughs
Zero waste	Waste	Transport and mobility	Quality affordable housing
Sustainable transport	Biodiversity	Waste	An increase in the skills base of people living and working in the UK
Local and sustainable materials	Inclusion	Water	A culturally diverse society that engages positively in work, community and in cultural institutions
Local and sustainable food	Health and well-being	Materials	People adopting healthier ways of living through sport and better lifestyle choices
Sustainable water		Biodiversity and ecology	Long term job prospects for Londoners and other UK residents
Natural habitats and wildlife		Land water noise and air	Disabled people able to freely access services, jobs, homes and community activities
Culture and heritage		Inclusion	Sites ready for future sustainable, low impact development
Equity and fair trade		Supporting communities	Residents adopting good environmental practices such as recycling and waste reduction
Health and happiness		Access	Minimal impact on climate change
		Employment and business	Public spaces and facilities that are accessible, well used and maintained
		Health and well-being	

This did not necessarily mean that sustainability had been excised from the Olympic project. Rather, it illustrated the emergence of the dominant rhetoric of the Games and the sense that regeneration had progressively assumed greater prominence in the nation's mind than sustainability, embodying a more pragmatic approach to the project and expressing tangible outcomes in terms of legacy. Sustainability continued to operate at a number of levels. These included: preparing for the Games in a sustainable way; staging the Games as sustainably as possible; creating a sustainable legacy of infrastructure, venues, housing and organizations that operate sustainably; and creating a legacy of sustainability in terms of behaviour and practice. Nevertheless, the cautious terminology and the guarded claims made for the Games in achieving sustainable outcomes did reflect the fact that

staging the world's largest mega-event is inherently an unsustainable activity. Part of the justification in environmental terms, therefore, is to leave a legacy of changed attitudes, instances of best practice, and new professional and industry codes of practice that will lead to reduced environmental impact in future projects. Indeed, these outcomes can, in a sense, be seen as offsetting the impact of London 2012. In the words of CSL: "We therefore cannot call the programme truly sustainable unless the inspirational power of the Games can be used to make a tangible, far reaching difference" [36].

Table 2. Legacy Promises.

Legacy promises DCMS June 2007	Legacy Promises London January 2008	Revised Legacy Promises December 2010
Making the UK a world-leading sporting nation	Increasing opportunities for Londoners to become involved in sport	Harnessing the UK's passion for sport to increase participation, particularly by young people—and to encourage the whole population to be more physically active
Transforming the heart of East London	Ensuring Londoners benefit from new jobs, business and volunteering opportunities	Exploiting to the full the opportunities for economic growth
Inspiring young people to take part in volunteering, cultural and physical activity	Transforming the heart of East London	Promoting community engagement and achieving participation across all groups in society
Making the Olympic Park a blueprint for sustainable living	Delivering a sustainable Games and delivering sustainable communities	Ensuring that the Olympic Park can be developed after the Games as one of the principal drivers of regeneration in East London
Demonstrating the UK is a creative, inclusive and welcoming place to live in, visit and for business	Showcasing London as a diverse, inclusive, creative and welcoming city	
Addition (December 2009) Bring about lasting change to the life experiences of disabled people		

There were no claims that the London 2012 Games would be carbon-neutral, but efforts were made to reduce carbon consumption where possible, including reducing embedded carbon during the construction phase. For the first time, estimates of the carbon footprint of the Games were made over the full seven-year span from winning the bid; a strategy that contrasted with that adopted for previous Games which had only focussed on the period of the Games and with the emissions associated with the staging of the Games. The carbon footprinting exercise produced a base line figure for carbon consumption, against which reductions could be measured. This exercise resulted in the calculation of a global sum of 3.4 million tonnes of CO_2 equivalent, which could be attributed to the different phases and components of the preparation and staging of the Games. The findings were that, without action, 50 per cent of emissions would come from the remediation of the site and the construction phase. This would rise to 67 per cent if transport infrastructure is included was the calculation. The staging of the Games accounts for just one third of the estimated emissions, of which 400,000 tonnes were attributed

to LOCOG-owned operations (35 per cent of this component), with spectator-related emissions expected to make up the remaining 65 per cent [37,38].

The carbon footprint was adjusted as figures and estimates changed during the preparation phases. In the final event, the actual footprint was measured at 3.3 million tonnes. At first glance, the measures taken by the ODA and LOCOG might seem to have made little difference to the global total but in reality major savings to the tune of 400,000 tonnes had been achieved, of which 70 per cent was attributed to savings achieved by the ODA in the preparation stage and 30 per cent to LOCOG in the staging of the Games. The area of major increase related to spectator-related emissions which rose from the original footprint estimate of 730,000 tonnes to 988,000 tonnes. This was attributed to the high levels of ticket sales and larger than expected numbers of spectators at venues, road races and the torch relay – all of which were a mark of the success of the Games but which, in terms of sustainability increased the level of emissions attributed to the event ([37], p. 20).

Three main areas that can be identified when evaluating the outcomes of the sustainability agenda in the London 2012 Games: the planning, site preparation and construction phases; the staging the Games themselves; and the challenges that faced the organisers in meeting the sustainability goals. As has been noted above, the ODA achieved considerable carbon reduction in the preparation stage, with commendation of the sustainability standards built into their policies, plans, procedures, and contracts as being examples of best practice. At the outset of the project, the future Olympic Park had to be cleared of existing buildings and structures, and the contaminated soil reclaimed. The zero waste policy meant that no demolition materials went to landfill and all were recycled or reused (exceeding the initial target of 90 per cent). BioRegional, however, was critical of the level of reclamation and reuse, arguing that at 0.5 per cent this was well below what could have been expected. Possible reasons for this were that there was no specific targets for reclamation or for reuse, which are more expensive options ([39], p. 4) and that the task of demolition generated substantial amounts of material in a relatively short period, with insufficient space for on-site separation and storage of materials that were suitable for reclamation and reuse. BioRegional concluded that significant levels of reclamation and reuse require targets and incentives and that more attention to the development of an infrastructure that could handle reclaimed material is required ([39], p. 39). The problems of soil contamination from previous industrial activity and from an old landfill site that had left a legacy of contaminants including tar and heavy metals were tackled with five soil washing machines on site, treating some 2 million tonnes of soil from a 246 hectare area in less than three years—a task which normally would have taken between 5 and 15 years [40]. This resulted in the on-site reuse of 80 per cent of the previously contaminated soil, thereby avoiding the need to transport soil off-site or import clean soil [41]. Throughout, use road transport was kept to a minimum, with materials transported primarily by rail. By contrast, much less use was made of the canal navigation system than had been originally planned.

With regard to design, the construction of venues was undertaken with a view to ensuring sustainable sourcing of materials, the use of recycled materials, and reduction in usage of embedded carbon by reducing the use of concrete (which requires 4 tonnes of CO_2 equivalent to make one tonne of concrete) and steel (where 2 tonnes of CO_2 equivalent are required to make one tonne of steel). On the basis of such calculations, venue design was revisited and savings made to reduce embodied carbon. In the case of the main Olympic stadium this amounted to 38 per cent. For the Velodrome, a saving of 15 per cent was achieved by redesign of the roof [42].

The energy strategy for the Olympic Park was encapsulated in the slogan "mean, lean, green" with reduced energy needs through efficient venue design, an efficient energy supply and the employment of renewable energy sources. The most effective embodiment of the "mean" design approach was seen at the Velodrome – the most energy efficient venue on the Olympic Park. The 31 per cent energy performance saving seen here, itself significantly above the ODA target of 15 per cent ([43], p.8) was achieved though natural ventilation, roof design, use of daylight, low energy lighting, insulation, and building management systems [44]. Other key venues that achieved energy efficacy improvements included the Handball Arena and Eton Manor (20 per cent), the Media Press Centre (18.1 per cent), the Aquatics Centre (15.3 per cent) and the Olympic Stadium (15.1 per cent) ([43], p. 8).

The energy supply to the Park was planned in an integrated fashion with a district heating system comprising two energy centres (at King's Yard and Stratford City), 48 heating substations, 23 cooling substations and a pipe network linking the permanent venues and structures—the largest such scheme in the UK ([43], p. 1). These energy centres, which supply the Westfield shopping Centre and the Olympic Park both have Combined Cooling Heat and Power (CCHP) units that run on natural gas, with King's Yard also having a biomass boiler that uses locally sourced woodchips. King's Yard has additional capacity whereby it will be possible to install further CCHP units for the legacy phase of the Park with its new planned neighbourhoods and business and commercial centres. However, both the CSL ([36], p. 66) and Bioregional/WWF ([45], p. 13) commented on the failure to generate fuel from sustainable sources with the exception of the single biomass boiler in King's Yard [36,43]. The operator has a 40-year contract and CSL feels it is unlikely that there will be an opportunity or incentive in the future to convert to more sustainable sources, even if in theory this would be possible [36,45].

The final strand of the energy policy was a commitment made at the bid stage to source 20 per cent of energy for the Park from sustainable sources. At the centre of this plan was a large wind turbine in the north of the Olympic Park, which would cater for 13 per cent of the energy demand, with the biomass boiler in the King's Yard energy centre contributing another 7 per cent. Cancelation of the wind turbine project, however, meant that the 20 per cent target could not be met—a failure that drew sharp criticism from environmental agencies and the press. Indeed, despite the deployment of seven smaller wind turbines and increased solar energy usage, the final renewable energy figure was only 10.8 per cent. To offset the shortfall and perhaps deflect some of the criticism, therefore, the ODA contributed to the Mayor of London's RE:NEW and RE:FIT schemes to install energy-saving measures in 2800 homes and 12 schools respectively in the host boroughs through interventions such as insulation, smart meters, and efficient lighting [46].

Sustainability, therefore, was an important element in framing the planning and delivery of the Games—as befitted an issue of sufficient concern to be regarded as a pillar of Olympism. Moreover, taken as a whole, LOCOG and the ODA could point to demonstrable successes in meeting the technical challenges posed by addressing sustainability criteria. Yet, representation of that message or about the centrality of sustainability to the public was at best *sotto voce*, with few people seeming to recognise the One Planet slogan or the concept's relevance. To take an example, in the Autumn of 2010, a Government department had funded BioRegional to set up a "One Planet Experience Centre" to explain the concept involved to the general public, outlining its aims, the progress in achieving them, and, with the help of interactive displays, to show people how to save energy and reduce waste. Yet rather than being displayed at a prominent place in central London or a similar location, the Centre

was accommodated in a former showhouse of the Beddington Zero Energy Development (BedZED) at Hackbridge, a small suburb in Surrey. While this might seem a sympathetic environment given that BedZED is a pioneering, environmentally friendly housing development, the site's peripherality to the capital meant that it gained very few visitors—a problem compounded by the fact that the local population resisted any external signage to the exhibition. Equally, during the Games, BioRegional offered an exhibition on the One Planet principle, but this was locked away behind the security screens in Athletes" Village and was inaccessible to the Games" spectators. Its total of 2000 visitors and 900 pledges to live better unquestionably represented only a small fraction of what it might have achieved in a more accessible location.

By contrast, the emphasis on legacy was ubiquitous. The key element was always likely to be the transition of the Olympic Park to its post-Games condition—in itself a potential touchstone of the veracity of the promises made about the entire project. An Olympic Park Legacy Company (OPLC) had been established in May 2009 to draw up the legacy master plans for the Park (now known as the Queen Elizabeth Olympic Park). This was a not-for-profit public sector company with equal input from the Mayor of London and Government. However, government legislation in November 2011 (the Localism Act) gave Mayors the power to establish Development Corporations in areas, within their sole control, that were in need of regeneration. This led to Boris Johnson, who had become London's Mayor in 2008, submitting proposals for the replacement of the OPLC with a mayoral Development Corporation, known as the London Legacy Development Corporation (LLDC). When established in April 2012, it was an organization with more devolved powers than the old OPLC and with responsibility for a somewhat larger area that was no longer coterminous with the narrow confines of the park itself. Its aim was:

> To promote and deliver physical, social, economic and environmental regeneration of the Olympic Park and its surrounding area, in particular by maximising the legacy of the 2012 Olympic and Paralympic Games, by securing high-quality sustainable development and investment, ensuring the long-term success of the facilities and assets within its direct control and supporting and promoting the aim of convergence [47].

While clearly still addressing the agenda of the post-Games transformation of the area, its wider spatial and development remit make it probable that it will be less tied to the Games *per se* than the OPLC might have been. In addition, the six boroughs of London than hosted the Olympic sports and service venues (the "host boroughs") will increasingly press their case and interests to be firmly recognised in shaping the Olympic legacy.

According to the Masterplan introduced in 2012, the Queen Elizabeth Olympic Park would become a new district of London (designated as having an E20 postcode), that contained housing, commercial and employment areas, and leisure spaces. The already constructed Athletes' Village, renamed the East Village, would be converted into 2818 homes. At the time of writing, the first residents are due to move in imminently. In addition, five new neighbourhoods are to be built in the Park, providing a mixture of accommodation (houses and flats for purchase, part ownership or rent including social housing and affordable housing). District names were chosen through public competition: East Wick, Chobham Manor, Sweetwater, Pudding Mill and Marshgate Wharf. The vision is proffered of an environment that would support and encourage more sustainable living, with appealing artists'

impressions of inhabitants engaged in walking, jogging, cycling, growing food in gardens, and taking the air on their balconies. With regard to open space, the northern area will be wilder and offer greater biodiversity, whereas the southern area (around the Olympic Stadium and close to Westfield Shopping Mall) will be leisure and events-oriented—intended to become an animated space along the lines of the Tivoli Gardens in Copenhagen or the South Bank in London.

4. Discussion and Conclusion

The transition from pre- to post-Games conditions was always likely to be challenging, particularly given that the principal bodies responsible for delivering the Games (the ODA and LOCOG) were being wound up and their staff dispersed. The CSL too was prematurely terminated on grounds of costs, with no more monitoring carried out after March 2013. Each of these had been institutions with a clear idea of what needed to be delivered for staging the Games that operated according to a timetable that could not be relaxed and with a coherent vision of *how* they should be delivered sustainably. These were replaced by the LLDC, which is working in a very different economic and political environment, and by other public and commercial service providers that had not been central to the Olympic project.

Such changes, with associated uncertainties over finance and political will, complicate the already difficult business of translating visions into reality and delivering the Legacy Promises. The extent to which they will be achieved remains problematic from a variety of standpoints. There is no doubt, for example, that the regenerated Olympic Park will be able to dispose of residential properties, especially given the buoyant London housing market. Yet even with the provision of affordable housing, it remains doubtful that many of the new residents will stem from the deprived communities that live adjacent to the Park or even that the proportion of affordable housing will remain sacrosanct in the long-term. Similarly with employment, it remains to be seen as to how many of those working in the firms and organizations attracted to the Park stem from the host boroughs. If key elements in arguments about legacy were social and economic sustainability, it is difficult to see what mechanisms are likely to support and enhance local community structures or to address deprivation. In their report, BioRegional/WWF [45] identified seven areas of concern that span the economic, social and environmental dimensions of sustainability. These comprised: the extent of energy consumption in the post-Games housing estates (especially the former Athletes' Village); the failure of zero waste policies to be rolled out across East London (recycling; composting waste; converting waste into renewable energy); the absence of an increased market for recyclables; lack of training and job opportunities locally in re-manufacturing; problems in maintaining the local and sustainable supply chain of materials; the failure to make the Lower Lea Valley self-sufficient in water; and the difficulty in creating a distinctly "green" business hub (*i.e.*, specialising in typically environmentally-friendly activities).

These all relate in some way to the downplaying of the sustainability agenda in the area as a whole and a failure to build on the best practice. The first point about energy consumption in the Athletes' Village, for example, relates to the fact that planning permission for the Village was deliberately rushed through before the tightening of environmental standards in order to encourage developers who might have been put off by stricter regulations. Many of the other points relate to local authority or government unwillingness to consider funding environmentally-motivated initiatives at a time of

public financial retrenchment [48]. Yet, more significantly, there is no doubt that legacy, sustainability's allied and overlapping counterpart as an agenda for London 2012, emerged as *the* central notion in discourse about post-Games transition. Legacy could immediately be translated into the visible transformation of East London, allied with a sense that a seismic shift had occurred in the geography of London through the investment, accessibility, attention and aura of success that emanated from the Olympic project. Faced with that competition, it was perhaps inevitable that sustainability, with its basis often in less accessible conceptual and ethical arguments, might well take a subsidiary role.

Acknowledgments

An earlier version of this paper was given as a Keynote Address to the Conference on "Welcoming, Hosting and Celebrating the Olympics", held in Rouen, France and sponsored by the Société Française d'Histoire du Sport in conjunction with British Society for Sports History and the International Society of Olympic Historians in October 2012. We are grateful to conference participants for their helpful comments and suggestions about the issues that it raises.

Conflict of Interest

The authors declare no conflict of interest.

References

1. British Broadcasting Corporation (BBC). *Twenty* Twelve, BBC television channels 2 and 4, 13 episodes, multiple screenings between Monday, 14 March 2011 and Tuesday, 24 July 2012 (dir. J. Morton).
2. Weber, E. Pierre de Coubertin and the introduction of organised sport in France. *J. Contemp. Hist.* **1970**, *5*, 100–110.
3. Geyer, M.H.; Paulmann, J. Introduction: the Mechanics of Internationalism. In *The Mechanics of Internationalism: Culture, Society and Politics from the 1840s to the First World War*; Geyer, M.H., Paulmann, J., Eds.; Oxford University Press: Oxford, UK, 2001; pp. 1–25.
4. Gold, J.R.; Gold, M.M. From A to B: The Summer Olympics, 1896–2008. In *Olympic Cities: City Agendas, Planning, and the World's Games, 1896–2016*, 2nd ed.; Gold, J.R., Gold, M.M., Eds.; Routledge: London, UK, 2011; pp. 17–53.
5. Meyer, M. Berlin 1936. In *Olympic Cities: City Agendas, Planning, and the World's Games, 1896–2016*, 2nd ed.; Gold, J.R., Gold, M.M., Eds.; Routledge: London, UK, 2011; pp. 215–232.
6. DaCosta, L. *Olympic Studies: Current Intellectual Crossroads*; Editora Gama Filho: Rio de Janeiro, Brazil, 2002; pp. 69–90.
7. Monclús, F.J. The Barcelona model: and an original formula? From "reconstruction" to strategic urban projects (1979–2004). *Plann. Persp*. **2003**, *18*, 399–421.
8. Essex, S.J. The Winter Olympics: Driving urban change, 1924–2014. In *Olympic Cities: City Agendas, Planning, and the World's Games, 1896–2016*, 2nd ed.; Gold, J.R., Gold, M.M., Eds.; Routledge: London, UK, 2011; p. 61.

9. Terret, T. The Albertville Winter Olympics: unexpected legacies—failed expectations for regional economic development. *Int. J. Hist. Sport* **2008**, *25*, 1903–1921.
10. Olson, L.L.K. Power, Public Policy and the Environment: The defeat of the 1976 Winter Olympics in Colorado. Ph.D. Thesis, Department of Political Science, University of Colorado, 1974.
11. Kim, J.; Choe, S.-C. *Seoul: The Making of a Metropolis*; John Wiley: Chichester, UK, 2007.
12. World Commission on Environment and Development (the "Brundtland Commission"). *Our Common Future*; Oxford University Press: Oxford, UK, 1987; p. 43.
13. Lesjø, J.H. Lillehammer 1994: planning, figurations and the "green" winter games. *Int. Rev. Sociol. Sport* **2000**, *35*, 282–293.
14. Cantelon, H. The Making of the IOC environmental policy as the third dimension of the Olympic Movement. *Int. Rev. Sociol. Sport* **2000**, *35*, 294–308.
15. Chappelet, J.-L. Olympic environmental concerns as a legacy of the Winter Games. *Int. J. Hist. Sport* **2008**, *25*, 1884–1902.
16. International Olympic Committee. *The Environment: The Third Dimension of Olympism*; International Olympic Committee: Lausanne, Switzerland, 2000.
17. Gold, J.R., Gold, M.M., Eds. *The Making of Olympic Cities*; Routledge: London, UK, 2012; pp. 1–152.
18. Macrury, I.; Poynter, G. The Regeneration Games: commodities, gifts and the economics of London 2012. *Int. J. Hist. Sport* **2008**, *25*, 2072–2090.
19. International Olympic Committee. *The Olympic Charter*; International Olympic Committee: Lausanne, Switzerland, 1991; p. 9.
20. International Olympic Committee. *The Olympic Charter*; International Olympic Committee: Lausanne, Switzerland, 1996; p. 11.
21. International Olympic Committee. *Sustainability through Sport*; International Olympic Committee: Lausanne, Switzerland, 2012; p. 5.
22. Lenskyj, H.J. Sport and corporate environmentalism: The case of the Sydney 2000 Olympics. *Int. Rev. Sociol. Sport* **1998**, *33*, 341–354.
23. Cashman, R. *Sydney Olympic Park 2000 to 2010: History and Legacy*; Walla Walla Press: Sydney, Australia, 2011.
24. International Olympic Committee. Focus: What is the Olympic Games Global Impact Study? *Olympic Review*, June 2006. Available online: http://www.olympic.org/Documents/Reports/EN/en_report_1077.pdf (accessed on 19 June 2013).
25. International Olympic Committee. *The Legacy of the Olympic Games 1984–2000: Conclusions and Recommendations*; International Olympic Committee: Lausanne, Switzerland, 2003.
26. Preuss, H. The conceptualization and measurement of mega sport event legacies. *J. Sport Tourism* **2007**, *12*, 207–227.
27. Smith, A. Theorising the relationship between major sport events and social sustainability. *J. Sport Tourism* **2009**, *14*, 109–120.
28. International Olympic Committee. *The Olympic Charter*; International Olympic Committee: Lausanne, Switzerland, 2003; p. 12.
29. Evans, G. London 2012. In *Olympic Cities: City Agendas, Planning, and the World's Games, 1896–2016*, 2nd ed.; Gold, J.R., Gold, M.M., Eds.; Routledge: London, UK, 2011; pp. 359–389.

30. Cohen, P. *On the Wrong Side of the Track? East London and the Post Olympics*; Lawrence and Wishart: London, UK, 2013.
31. BioRegional/WWF. Our Structure. Available online: http://www.bioregional.com/about-us/our-structure/ (accessed on 10 June 2013).
32. CAG Consultants. *Independent Evaluation of the Commission for a Sustainable London 2012 Final Report*; CAG Consultants: London, UK, 2013; p. 56.
33. Department of Culture, Media and Sport. *Our Promise for 2012: How the UK will Benefit from the Olympic and Paralympic Games*; Department of Culture, Media and Sport: London, UK, 2007.
34. DCMS. *London 2012 Olympic and Paralympic Games Impacts and Legacy Framework: Final Report*; Department of Culture, Media and Sport: London, UK, 2009.
35. DCMS. *Plans for Legacy from the 2012 Olympic and Paralympic Games*; Department of Culture, Media and Sport: London, UK, 2010.
36. Commission for Sustainable London 2012. *No Time to Waste. A Review of Waste and Resource Management across the London 2012 Programme*; Commission for Sustainable London 2012: London, UK, 2010.
37. London Organizing Committee for the Olympic Games. *A Legacy of Change: London 2012 Post-Games Sustainability Report*; London Organizing Committee for the Olympic Games: London, UK, 2012.
38. Commission for Sustainable London 2012. *Beyond 2012—Outcomes*; Commission for Sustainable London 2012: London, UK, 2013; p. 11.
39. BioRegional. *Reuse and Recycling on the London 2012 Olympic Park. Lessons for Demoliation, Construction and Regeneration*; BioRegional: London, UK, 2011; p. 4.
40. Atkins Fact Sheet. Olympic Park: remediation and earthworks. Available online: http://www.wsatkins.com/~/media/Files/A/Atkins-Global/Attachments/corporate/twenty-twelve/remediation%20%20earthworks.pdf (accessed on 23 June 2013).
41. Commission for Sustainable London 2012. Commission Statement on BP Target Neutral programme at the London 2012 Olympic and Paralympic Games. Available online: http://www.cslondon.org/2013/03/commission-statement-on-bp-target-neutral-programme-at-the-london-2012-olympic-and-paralympic-games/ (accessed on 23 June 2013).
42. Cullen, J.M.; Carruth, M.A.; Moynihan, M.; Allwood, J.M.; Epstein, D. *Learning Legacy: Reducing Embodied Carbon through Efficient Design*; Olympic Delivery Authority: London, UK, 2011; pp. 4, 7.
43. Epstein, D.; Young, A.; Knight, H.; Carris, J. *Learning Legacy: the Olympic Park Energy Strategy*; Olympic Delivery Authority: London, UK, 2011; p. 1.
44. Olympic Delivery Authority. *Learning Legacy. The Velodrome, the Most Energy Efficient Venue on the Olympic Park*; Olympic Delivery Authority: London, UK, 2011; pp. 1–2.
45. BioRegional/World Wildlife Fund. *Towards a One Planet Olympics Revisited*; BioRegional/World Wildlife Fund: London, UK, 2012; p. 13.
46. London Organizing Committee for the Olympic Games. *Delivering Change: Pre-Games Sustainability Report*; London Organising Committee of the Olympic and Paralympic Games: London, UK, 2012.

47. London Legacy Development Corporation. What we aim to achieve. Available online: http://www.londonlegacy.co.uk/about-us/what-we-aim-to-achieve/ (accessed on 10 June 2013).
48. Gold, J.R.; Gold, M.M. Future indefinite? London 2012, the spectre of retrenchment and the challenge of Olympic sports legacy. *Lond. J.* **2009**, *34*, 180–197.

© 2013 by the authors; licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (http://creativecommons.org/licenses/by/3.0/).