Dr. Frances Robertson
Design, History & Theory, Glasgow School of Art, UK
Fr.Robertson@gsa.ac.uk

Home address:

Power in the landscape: Regenerating the Scottish Highlands after WWII

This chapter examines cultural, political and material elements contributing to the insertion of hydro-electric power schemes into the Scottish Highlands after the Second World War, the result of the wartime Hydro-Electric Development (Scotland) Act of 1943. While this initiative was seen by modernising central planners as an urgent corrective to the long standing decline of this 'semi-derelict region' (Kirby 1946, 1), described as a land in a 'coma' from which it might never recover (*Highland Herald (HH)* 12 June 1947, 3) at the same time there was pressure to maintain the artificial wilderness of the Highlands as a 'cultural museum' (Burnett 2001) that was in the social imaginary a potent focus for how various local and national communities imagined themselves. Although design elements such as the site, buildings, and landscape architecture of specific hydro projects such as the Glen Moriston and Glen Affric schemes will be discussed in this chapter, they will not be considered in isolation. Instead, they will be addressed as additional design elements inserted into an already designed environment, making reference to the pre-existing historical processes of making and unmaking the Highland landscape as a wilderness area (Maver 2000). The result, as I argue, was that these major engineering projects of modernisation took on a monumental elegiac cast as expressions of the 'Celtic' culture being debated in the Highland region in the period of post-War reconstruction.

In the testimonies of various voices seeking to shape this 'real imagined community' at local and national levels we can see an imbrication of design processes of planning, mediation and installation of these significant engineering interventions into natural, human and geomorphological landscapes. The sustainability of hydro electric power schemes, at first glance so clean in comparison to fossil fuel power sources, are nevertheless subject to question due to their impacts on living landscapes and human communities (Kallhoff 2017; Kaika 2005; Gandy 2002). The Highland landscape was particularly charged with significance as a perceived wild natural region; after Second World War it was increasingly also considered as a common amenity subject to public consultation during planning proposals. Thus in the case of the Highland schemes discussed in this chapter we see that most argument was couched in terms of stemming human population decline, social justice, and access to the land. Researchers in other areas of history and cultural theory have already opened up new approaches to the examination of the 'material powers' at work in water flows across natural/ designed environments (Bennett and Joyce 2010; Cosgrove and Petts 1990); this paper will consider how these insights can inform and expand current debates within design history.

After Second World War, depopulation, absentee landlords, and lack of economic investment had maintained the Highland region as an artificial wilderness for well over a century, the results of repeated assaults on Highland culture first as pacification after the Jacobite rebellions and second due to the Clearances of 'uneconomic' crofting tenants by modernising landlords through the nineteenth century. The rugged Highland landscape of mountains, streams, forests is often described as 'unspoilt' with few signs of man's presence in houses, roads, fences, fields or factories. This empty and dramatically mountainous landscape gained enormous cultural value throughout the nineteenth century, first through the novels of Sir Walter Scott, and then, in a touristic feedback process, through landscape paintings, guides, and tourist experiences of favoured sites of amenity (Smith 1988, 92-3; Gold and Gold 1995, 1-4; John Morrison 2003, 47-48). However, this apparently untouched wilderness is highly managed and controlled. The land is used for large scale sheep and deer ranching or for the raising of

game birds such as grouse for elite shooting parties—all these resulted in a cropped, deforested and depleted biosphere that has been maintained from the late nineteenth century through to the present, in part due to patterns of unequal land ownership (McKenna 2013; Wightman 1997). Throughout this period, well-intentioned efforts, such as the 1884 Crofters' Act, sought to defend crofters in their unequal relationship with landowners, but the reality in the late 1940s was that there were many small unprofitable units maintained by demoralised, isolated crofting families who depended on welfare payments to keep afloat (Harvie 1977, 178). Overall in the twentieth century Scotland's economy was weak, in both the industrial Central Belt and in the neglected Highlands (Harvie 1977, 113; Lorimer 2000, 403-31). In the Highlands, Gaelic speaking communities lost voice and memory through the general official use of English as the language of education, work and commerce, while population fell through continued emigration, hastened by wartime service (Burnett 2010: 45).

With reference to previous hydro-electric developments in Scotland before the Second World War there are two examples that must be noted (Hannah 1979). First, although the Highland schemes that followed the Act of 1943 were discussed and received as a new and 'unprecedented opportunity for large-scale planning' (Association of Scientific Workers 1943, 75) there had been one earlier initiative that gained national attention at the start of the twentieth century. The British Aluminium Company (BACo), founded in 1894, developed hydro-electric aluminium smelting operations in the Western Highlands and at overseas plants in Norway, Canada and Guyana in the first half of the twentieth century (Perchard 2012, 25-8). Their first plant opened in Foyers on Loch Ness in 1896, harnessing power from an already renowned tourist site, the Falls of Foyers, a roaring torrent that to its many admiring viewers was an epitome of the sublime forces of Nature. BACo's plans to take over this beauty spot for industrial use prompted public debate with letters to the *Times* of London from such campaigning bodies as the newly formed National Trust for Places of Historic Interest and Natural Beauty, founded in 1895, and supported by such vocal critics as John Ruskin or the Duke of Westminster (Perchard 2012, 191-195). That debate to some extent established a framework for later discussions, establishing terms in which scenic beauty was pitched against economic regeneration. As a result, more nuanced concerns about environmental and human health dangers from pollution were sidelined (Perchard 2012, 201). We might note also BACo's strategy of 'conservative modernisation', with an emphasis on order and tradition through their support for Highland Gaelic cultural events (Perchard 2012, 247) that echoed with the ways in which the later Highland schemes were put forward. In addition, and well south of the Highlands in the agricultural Galloway region by the border with England, a hydro-electricity generating scheme was constructed along the Dee and Doon river systems in 1931-36, a large capital investment that had only become profitable due to the recent creation of a British Central Electricity Board (CEB) in 1926 with executive powers to construct and operate a national grid and to centralise power generation (Hudson and Hunter 1938: 7; Hannah 1979: 100-104). Electricity was an exportable national product in this context. In marked contrast to the styles later developed in the post war Highland projects, architects on this scheme designed streamlined and functionalist avant-garde forms, with blocky, factory-like white turbine halls (McKean 1987: 6-7; Robertson 2014) asserting an aggressive command over the rivers on which they stood. In more mainstream urban environments of the period in Scottish cities of the central industrial areas we see a similar streamlined and functionalist modernism in buildings devoted to consumerism and leisure in department stores, cinemas or exhibitions such as the Empire Exhibition in Glasgow of 1938 (McKean 1987: 6-7). This period also saw new notions of Scottish identity that fused left-wing, progressive international modernism with nationalism, as for example in the journalism of the poet Hugh MacDiarmid, writing as C.M. Grieve, who aggressively promoted a constructivist-style 'machine aesthetic' rooted in engineering prowess with his vision of the artist-engineer (Normand 2000, 76-78). All these cultural factors from the pre-War schemes of national and local identity, national interest (not

at all the same thing) and modernisation were re-worked and re-made in the post-War debates centred on the Highland hydro schemes.

Re-articulations of longstanding conflict

In the local politics of the Highlands immediately after Second World War there were conflicting, disorganised and non-specialist views on reconstruction and regeneration. The most urgent problem was depopulation and lack of employment. Many young workers from the Highlands, who had perhaps received technical training during the war on military or industrial service as engineers or nurses were actively being solicited as skilled immigrants by British Commonwealth nations such as Australia, Canada or South Africa (*HH* 14 August 1947, 2; 8 January 1948, 2). There was potential for newcomers to come in to the area to address labour shortages and stem population loss. For example DPs (Displaced Persons—wartime refugees from Europe) were suggested as a means to 'repopulate the glens' (*HH* 26 June 1947, 3; 3 July 1947, 1) or as potential farm servants (*HH* 12 June 1947, 3), but often this conflicted with a narrow Gaelic parochialism. There were bigoted attitudes to any incomers, not just foreign DPs, but also to Scots and English people from outside the region, reviled by local crofters as 'the scum of the industrial midlands of England and Scotland' (quoted in Burnett 2010: 58).

Who then was entitled to speak and act in the region? Beyond local debate, we also hear more centralised powerful voices. Hydro schemes were a vast capital investment reflecting the bureaucratic power of central government planning, a type of power structure developed as a response to the two World Wars (see also Fallan and Jorgensen 2017: 111). Indeed, hydro schemes and electrification projects have often been prompted by catastrophes such as war; we see this after World War One with the foundation of the National Grid and Central Electricity Board in Britain 1926, or with the Tennessee Valley Authority in the United States in the 1930s in response to the collapse of agricultural regions during the Depression, and of course with the new hydro schemes in the post-war reconstruction era after WW2 (Hughes 1983, 285-323).

Established vested interests in Britain however opposed hydro investment, for example, the Mining Association of Great Britain, promoting coal and fearing hydro power as a rival, (Maver 2000: 369), or powerful landowners and wealthy bourgeois summer visitors who arrived for hunting or more artistic pursuits. Back in the metropolis, such privileged writers and artists had access to persuasive channels of communication and lobbying (Lorimer 2000: 403-411). On the side of opposition to any kinds of change in the Highlands, there were some unexpected alliances of the extremely wealthy and dispossessed, and an exceptionally uncomfortable mixture of resentment and grievance. For example there was the lobbying power of Gaelic movements amongst the urban diaspora of economic migrants working in Lowland Scotland, embittered exiles maintaining the image of the true highlander as a Gael and a crofter. The problem of the Highlands as a 'cultural museum' came in part from the power of interested groups outside—who all wanted the region to be kept in 'cold storage'—against the moment, if and when, they might return (Burnett 2010, 40; 58; Maver 2000, 370). The static and seemingly untouched landscape came to be one of the major icons of the true Highland identity—as indeed, increasingly, this Highlands image also came to stand as the touristic icon of Scotland in general (Gold and Gold 1995; Morrison 2003).

Nature, standing reserves, and infrastructures

In this paper I use the shorthand word 'hydro' because this became a familiar word in Scottish daily life and conversation, referring to the local energy provider (to use a current market-oriented term) and important local employer the North of Scotland Hydro-Electricity Board (NoSHEB). Like other hydro schemes around the world the works did by necessity involve water control and supply. But in

Scotland, with a notoriously damp climate and rain-fed agriculture, hydro really meant 'electricity' electricity for home and work use or to feed into the National Grid, the nationwide 'networks of power' that in Thomas Hughes's phrase are symptomatic of 'modern human societies' (Hughes 1983: 1). 'Hydro' in daily life and speech also signified employment opportunities, such as labouring work on civil engineering projects and infrastructure. The labouring work was extensive, with tunnelling, dam construction and other works of water diversion alongside the work involved in building more conventional structures such as the turbine halls that remained as markers in the landscape after completion. When the Hydro-Electric Act of 1943 was passed at the height of the war, the then Secretary of State also approved two associated planning groups, the Fisheries Committee and the Amenity Committee (Berry 1956, 25) to consider wider environmental impacts on the useful wild species (salmon and trout) and the scenic beauty of the Highlands. Framed in these terms, environmental discussions and enquiry seem to be focused on certain immediate human-centred concerns. Indeed, we see these interests also represented in the language of a group that we might expect to represent 'wildlife' more generally after the war, Nature Conservancy Scotland. In an evaluation of the impact on nature conservation of the post-war hydro schemes in Scotland, the Director John Berry did certainly consider the 'drastic interference' threatened across wide tracts of countryside by: water diversion works; associated changes from acid to alkaline balance in soil and water; and changes in speed of water flow in streams and lakes, all of which would have profound effects on local ecosystems (Berry 1956, 23-4). However, his discussions concluded with a defence of those useful changes in the hydro-engineered environment that would benefit salmon and trout at the expense of those 'vermin' of wild water, migratory eels, or such 'coarse' predatory fish as perch and pike (Berry 1956, 33-6). Salmon and trout were wild animals but were important species in the the economic calculations of the landowners who rented out fishing rights. At the expense of labouring the obvious, Scottish hydro schemes appear to fit exactly into Heidegger's notion of enframing the earth as a resource for use that was put forward in his essay 'The question concerning technology' where he described the way in which nature was now treated as a 'standing reserve' (Heidegger 1977 [1956], 17-18). In particular, his comments on the hydro-schemes on the River Rhine, as 'a power supplier deriving from the essence of the power stations' and as a Romantic landscape 'on call for inspection by a tour group ordered there by the vacation industry' (Heidegger 1977, 16) certainly echo with the preoccupations of his time and with the task of post-War reconstruction conceived as regional regeneration in the Highlands. The apparent emptiness of the denuded and depopulated glens appeared as an opportunity to technologically minded post war planners who hoped to see new electro-chemical, electro-metallurgical, and light industries supporting well-designed new towns of substantial population. As the Scottish Area Committee of the Association of Scientific Workers put it in 1943, looking forward to post-war utilisation of hydro-electricity, Highland Power, the region had all the 'inviting characteristics of a blank canvas' (Association of Scientific Workers 1943, 77). Previous developments such as BACo's aluminium smelting plants and worker accommodation at Kinlochleven were dismissed as 'slums' (Association of Scientific Workers 1943, 56-60), the product of narrowminded unregulated private enterprise. The reason why the post-War hydro schemes could be discussed and viewed as something entirely new was due to their regenerative function as, it was hoped, one of the 'greatest sociological experiments in history' that might stand alongside the Tennessee Valley Authority, established in the Depression era United States in 1933, or the spectacular modernisation projects projected by the wartime British ally, the USSR (Association of Scientific Workers 1943, 77).

In terms of design elements, we have the land itself, we have the systems and networks, and we also have at individual level, the designed structures themselves—the stuff of more object-oriented design history. The hydro schemes help us to think across these levels of analysis and link up 'style' talk with broader environmental and social future discussions. Indeed the nature of the Highland landscape, as a

made and controlled environment masquerading as virgin land, means we have to make those links at all levels. My own previous approaches to research on this region have been focused mainly on landscape as an ideological construct where power structures are displayed or enacted in accord with the investigations of writers such as Hechter on the 'celtic fringe' of Britain (1975), or in more general critical terms, the contributions of W.J.T. Mitchell, Cosgrove and Daniels, or David E. Nye (2002; 1998; 2000). In terms of designed structures and engineering, infrastructural works in the Highlands from at least since the canal and road projects of Thomas Telford in the early nineteenth century (Robertson 2017; Rackwitz 2007) have both fostered tourism and worked alongside ideological representations of the Highlands in art and popular culture. Beyond such imposing structural interventions such as the engineered designs for buildings, roads, harbours, canals or dams, however, we should also consider the designs that built into legislation, patterns of ownership, land use and cultivation.

Celtic culture

Having noted the progressive version of Scots nationalism in the 1930s and its machine aesthetic, we must equally recognise that many of these moderns also cultivated a form of Celtic Revivalism in support of independence agitation. Certain forms and motifs associated with Celtic art in the post war period came to symbolise Highland culture through the promotion of hand made craft items for tourist consumption. One prominent figure in promoting this particular strand of visual Celticism was George Bain who had worked as an art teacher in schools and evening classes in the interwar decades promoting Celtic Art, and specifically techniques of so-called 'knotwork' or interlace as a national style first in pamphlets then in the book Celtic Art: the methods of construction (Bain 1977 [1951]; Normand 157-159; George Bain Collection online). Bain established a Celtic art study centre at Drumnadrochit in 1949 and his version of Celtic art was promoted frequently in the *Highland Herald* and at regional trade fairs as a spur to local craft (HH 12 June 1947, 2; 21 August 1947; Help for the Highlands 1953, 15). Celtic knotwork did not, unlike tartan, conjure contemporary and angry realities of recent Highland history of the 18th and 19th century, taking the viewer's in imagination back to centuries before any possibility of Assman's notion of 'communicative memory' (Assman 1995, 125-133; Rackwitz 2007, 229-231; Mackechnie 2008-9). Instead it evoked an ancient and virtuous world on the fringes of the collapsing Roman Empire, defending learning in the dark ages, thus gaining power as an ahistorical consoling myth. Perceptions of the Celtic Highlands were supported by the enormous number of ancient sites remaining in the area that were heavily protected by the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS), established in 1908 and energised by archaeological interest and growing tourism. These myths fed into official policies, so despite concerns about depopulation, the Highlands were treated as a 'cultural museum' (Burnett 2010: 36), 'traditional occupations' were given priority by economic planners.

Hydro schemes and architectural traditionalism

The economic initiative after the Second World War of the NoSHEB hydro schemes gave rise to dams, worker camps and power stations that functioned in the landscape as signs of modernisation and investment. These hydro schemes in the Highlands were promoted by the left wing Labour government, elected after the war (Harvie 1977, 178; Payne 1988); indeed without this support it is unlikely this state funded intervention would have happened. While opposition came from a very diverse conglomeration of interests as already noted, the Scottish Labour Party worked hard to stress the cultural benefits of electrification as modernisation; as the Scottish Labour Party's *Plan for Post-War Scotland* proclaimed, if the Highlander had 'electric light, radio and a garage; had it been in reasonable reach of a cinema and a good dance band' then he would not leave the region (*Plan* 1943, 23, quoted in Burnett 2010, 42)].

A major inspiration for the Highland hydro schemes as a regional reviver was the Tennessee Valley Authority (TVA)—an 'adventure in planning' promoted in a short illustrated wartime publication of the same name by Julian Huxley in Britain purposely to propagandise schemes such as NoSHEB. The TVA had deliberately included an entire regional infrastructure of industry, farming, transport, and tourism in which the TVA's hydro dams provided a central focus for visitors, with their combination of crafted landscapes of forest and roaring waters with the most austere and geometrical modern architecture and engineering, and hailed as part of a new and democratic aesthetic order: 'the modern eye can appreciate more easily the beauty in machinery than it can in the fine arts' (Huxley 1943; Robertson 2014)]

In contrast to TVA, and despite the high aims of central planners such as Kirby (1946) and technocrats such as the Association of Scientific Workers (1943), in Highland Scotland the hydro schemes had no guaranteed attached infrastructure built in and were just about the only economic and cultural edifices on the horizon, thus gaining an increased monumental function as markers of an important moment. Observing the aesthetic of austere simplicity endorsed by the Imperial War Graves Commission after the First World War (Stamp 1977, 10), I argue that the Highland hydro structures functioned as a collective memorial after the Second World War first because of their position as significant landmarks in a charged landscape, and secondly, because like other war memorials they act to close debate. Other hydro projects had already been invested with monumental functions, for example the TVA dams were promoted as straightforward modernist monuments, while elsewhere, notably at the Marathon Dam constructed for the city of Athens, we see instead a deliberate invocation of ancient history in alliance with modernity. In her book *City of flows* (2005) Maria Kaika describes how, in Athens, a scheme to bring water to the city was conflated with an archaeological project of excavating and restoring the city's ancient aqueduct (Kaika 2005: 80; 128). Thus dams and hydro projects were not merely monumental in scale, but in function also.

In the post war era architects were expanding the scope and scale of their constructive projects designing at the scale of the landscape rather than the individual building. In part this was promoted by the enlarged landscape view of the wartime aerial bomber (Duempelmann 2013), but also by the new profession of landscape architect and new conceptions of monumentality in architecture, strongly infused by a modernist respect for abstract functional structures and a stronger rapprochement between architects and engineers. In an edition of the Architectural Review dedicated to the 'search for a new monumentality' one contributor, William Holford remarked on the insight offered by Paul Nash's painting *The Battle of Britain* (Nash 1941, Imperial War Museum) of the expressive power and new importance of the aerial view: 'from a great height we become conscious of geographic rather than architectural truths... Tennessee Valley and Greater London enter the range of the monument' (Paulsson et al 1948, 125). We see this alliance of architecture, engineering and landscape considerations in Sylvia Crowe's landscape architectural practice as she describes it in *The landscape* of power (Crowe 1958). The heightened democratic and levelling spirit promoted by the Post-War Labour government encouraged the idea of beneficial memorials for example through greater access to 'the land', marked by the establishment of the National Land Fund in 1946 (Stamp 1977) intended to promote recreational and cultural enjoyment of the British countryside, followed by legislative support in the National Parks and Access to the Countryside Act of 1949. [Insert Figure 1 and caption after here

The Highland landscape was particularly charged with significance as a wild 'natural' region because after Second World War it was increasingly also considered as a common 'amenity' subject to public consultation during planning proposals. Planners and the public were on guard against hydro power as

'industrial encroachment on the countryside' (Lea 1968: 239). Several areas lost their designated status as areas of outstanding natural beauty (see W.H. Murray *Highland landscape* 1962, cited in Lea 1968: 246). These concerns are directly addressed in Sylvia Crowe's landscape consultancy work for post-War hydro schemes in the Highlands that aimed to respect the landscape in various ways (Crowe 1958, X) with power stations (as in Glenmoriston, see Figures 1 and 2) being sited underground, with water supply pipes buried or disguised by planting. Instead of the pre-War industrial modernism for hydro architecture the favoured architectural style was a 'Traditionalist' Scottish modernism with the power stations in the Highlands designed by James Shearer celebrated by architectural historian Miles Glendinning as the 'climax of traditionalist movement' (Glendinning 1997, 2). Shearer, the architect of Fasnakyle power station rejected Modernist excitement at the display of industrial power, instead he emphasized the concealment of power beneath the serenity of elevated landscape, hailing the 'stillness of the place, over which only the clouds now move... no visitor walking in the quiet forecourt at Fasnakyle has any inkling he is crossing three eight-feet diameter pipes containing water with an explosive pressure of four hundred and fifty feet of head' (Glendinning 1997, 7). The locally quarried rough stone facing of the turbine hall at Fasnakyle, reminiscent of sixteenth or seventeenth century Scottish fortifications, was embellished with Hew Lorimer's sculptural Celtic beasts, and use of locally quarried rubble for the stations (MacInnes et al 1997:103; Canmore Fasnakyle online images). [Insert Figure 2 after here

The hydro-electric power schemes in the Scottish Highlands function as 'sites of memory' (Nora 1996); a recognition of past troubles, but also as markers of oblivion and repression. Although the immediate impetus for the schemes was post war reconstruction, this was in tension with conservation of a natural scenic area. Over all there loomed the unresolved conflict still present to the minds of most commentators of the long drawn out collapse of 'Celtic' or 'Gaelic' culture in the north and west of Scotland, and the dispossession of indigenous populations. Monumental markers in the Highland landscape rest in man-made structures such as buildings and ancient sites, and in designated natural forms, such as mountains and waters. Hydro schemes are monumental markers of time and change, and of public consensus, capturing both stasis with vast immovable forms of dams and turbine houses, and temporality with the flow of the water and energy. They also take on a more sinister aspect of the war memorial, folding together and repressing continuing conflict. in an ultimately depressing design solution that recognised and reinforced the unequal power structures in the landscape.

From now, looking back, large scale hydro electric power schemes are now recognised to have an unacceptably high environmental impact on ecospheres and water basins (Kallhoff 2017) and, in contrast to the wartime enthusiasm we saw for the central planners of the USSR, they are now judged guilty by association with dictatorial regimes of all stripes (Frolova 2010). Although the Highland landscape was charged with significance as a wild 'natural' region to be defended by conservative interests it was increasingly also considered as a common democratically accessible national 'amenity' for urban populations. The design solution, favouring scenic beauty and the appearance of tradition, now appears as a depressing and cautious recognition and reinforcement of the unequal power structures in the land. In relation to current debates in environmental ethics and policy, we see that almost all the assumptions made in the post-War years by everyone concerned in the hydro schemes, either for or against, used anthropocentric arguments (man-centred) about clean energy, recreation areas, visual amenity (Kawall 2017: 15). Arguments for intervention and construction were couched in terms of stemming human population decline, social justice, and access to the land, although in actual terms many expectations and promises remained unfulfilled. While many recent writers dwell in similar terms to those of Heidegger on the nihilistic despair of the era of the artificial established after the Second World War (Dilnot 2015: 166-7), one solution to the questions raised in this chapter seems

to suggest we take social justice seriously, for the sake of the natural environment. As Holmes Rolston III—evaluating the term 'anthopocene' also advocates, if we are concerned about the impact of environmental change on the poor, it would be better to fight for more equitable distribution of wealth, in order to emphasise environmental justice (Rolston 2017, 70). In the Highlands—a depleted biosphere, artificially maintained by the practices that favour the 'empty landscape', we can see a local environment where social justice might also favour greater natural and human diversity—that would in turn lead to very different buildings and structures.

Figure captions (complete image files and full captions to follow)

Figure 1. North of Scotland Hydro-Electric Board Moriston Project Contract No. 50 No. 150 Ceannacroc Generating Station. Tailrace Tunnel. View of portal from bridge deck 2/7/56 This project record photograph shows the way in which a vernacular or traditional style of stonework facing was inserted so as to blend in to the natural living rock face.

Figure 2. North of Scotland Hydro-Electric Board Moriston Project Contract No. 50 No. 179 Ceannacroc Tunnel. Ceannacroc Generating Station. View of Machine Chamber from South West showing 16MW alternator 3/12/56 This project record photograph shows that underground structures were straightforwardly technical and functional, with few deliberate decorative or stylistic additions. Saved as Ceannacroc 50 179 machinechamber.jpg

References

Assman, Jan (1995) 'Collective memory and cultural identity' New German Critique 65 125-133

Association of Scientific Workers (1943) Highland power: a report on the utilisation of the Hydro-Electric power envisaged in the Hydro-Electric Development (Scotland) Act William Maclellan, Glasgow

Bain, George (1977 [1951]) Celtic art: the methods of construction London: Constable

Bennett, Tony and Patrick Joyce, eds (2010) *Material powers: cultural studies, history and the material turn* London: Routledge

Berry, John (1956) 'Hydro-electric developments and nature conservation in Scotland' *Proceedings of the Royal Philosophical Society of Glasgow LXXVII (III) 23-36*

Birksted, Jan, ed (2000) Landscapes of memory and experience Spon Press, London and New York

Burnett, J. (2001) 'The highlands and islands of Scotland as a 'cultural museum', 1900-2000' *Immigrants and minorities 20 (1)*

Canmore online site of RCAHMS: 'View of Fasnakyle Power Station with detail of carving in Pictish-style designed by Hew Lorimer' SC 1590246 Collection Tom and Sybil Gray (http://canmore.org.uk/collection/1590246)Accessed 27 February 2018

Cosgrove, Denis and Petts, Geoff (1990) Water, engineering and landscape: water control and landscape transformation in the modern period Belhaven Press, London and New York

Cosgrove, D. E. and Daniels, S. eds (1998) *The iconography of landscape* Cambridge University Press, Cambridge

Crowe, Sylvia (1958) The landscape of power The Architectural Press, London

Dilnot, Clive (2015) 'History, design, futures: contending with what we have made' in Fry, Tony, Clive Dilnot and Susan C. Stewart, eds *Design and the question of history* Bloomsbury Academic, London 161-271

Duempelmann, Sonia (2013) 'The art and science of invisible landscapes: camouflage for war and peace' in Boyd, Gary A. and Denis Linehan *Ordnance: War + Architecture & Space* Ashgate, Farnham Surrey 117-135

Fallan, Kjetil and Jørgensen, Finn Arne (2017) 'Environmental histories of design: towards a new research agenda *Journal of design history 30* (2) 103-121

Frolova, Marina (2010) 'Landscapes, water policy and the evolution of discourses on hydropower in Spain' *Landscape research 35* (2) 235-257

Fry, Tony, Clive Dilnot and Susan C. Stewart, eds (2015) *Design and the question of history* Bloomsbury Academic, London

'George Bain Collection' at Groam House Museum (http://www.groamhouse.org.uk/index.asp?pageid=36914) Accessed 26 February 2018

Glendinning, Miles (1997) Rebuilding Scotland: the postwar vision, 1945-1975 Tuckwell, East Linton

Gold, John R. and Margaret M. (1995) *Imagining Scotland: tradition, representation and promotion of Scottish Tourism since 1750* Scolar Press, Aldershot

Hannah, Leslie (1979) *Electricity before nationalisation: a study of the development of the electricity supply in Britain to 1948* Manchester University Press, Manchester

Harvie, Christopher (1977) Scotland and nationalism: Scottish society and politics, 1977-1977 George Allen & Unwin, London

Hechter, Michael (1975) *Internal colonialism: the Celtic fringe in British national development, 1536-1966* University of California Press, Berkeley

Heidegger, Martin (1977 [1956]) 'The question concerning technology' in *The question concerning technology and other essays*, trans William Lovitt Harper Perennial, New York 3-35

Help for the Highlands 1953 HMSO, Department of Secretary of State for Scotland and the Forestry Commission

Highland Herald Newspaper 1947-1970

Hughes, Thomas P. (1983) *Networks of power: electrification in Western society, 1880-1930* John Hopkins University Press, Baltimore and London

Huxley, Julian (1943) TVA: an adventure in planning The Architectural Press, Cheam, Surrey (War Address)

Hudson, William and John Kenneth Hunter 'The constructional works' *The Galloway Hydro-Electric Development* Reprint of papers presented to the Institution of Civil Engineers, 22nd February, 1938 London: Institution of Civil Engineers 6-42

Kallhoff, Angela (2017) 'Water ethics: toward ecological cooperation' in Stephen M. Gardiner and Allen Thompson, eds *The Oxford handbook of environmental ethics* Oxford University Press, Oxford 416-26

Kawall, Jason (2017) 'A history of environmental ethics' in Stephen M. Gardiner, and Allen Thompson, eds *The Oxford handbook of environmental ethics* Oxford University Press, Oxford 13-26

Kirby, Arthur H.M. Reprint pamphlet from Town and country planning Summer 1946 *The rebirth of the Scottish Highlands*

Lea, K.J. (1968) 'Hydro-electric power developments and the landscape in the Highlands of Scotland' *The Scottish geographical magazine 84 (3) 239-47*

Lorimer, Hayden (2000) 'Guns, game and the grandee: the cultural politics of deerstalking in the Scottish Highlands' *Cultural geographies* (*Ecumene*) 7 (4) 403-411

Luckin, Bill (1990) Questions of power: electricity and environment in inter-war Britain Manchester University Press, Manchester

MacInnes, Ranald, Miles Glendinning and Aonghus MacKechnie (1997) *Building a nation: the story of Scotland's architecture* Canongate, Edinburgh

Mackechnie, Aonghas (2008-9) 'Carn air a'mhonadh: Gaeldom's monuments - cairns, crosses, and celticism' *Journal of the Scottish Society for Art History13 22- 32*

Maver, Irene (2000) 'Water resources and Scottish identity in the nineteenth and twentieth century: purity, regeneration and landscape' in J.A.A. Jones, Kevin Gilman, Alain Jigorel and John Griffin, eds *Water in the Celtic world: managing resources for the 21st century* British Hydrological Society, Wallingford: 367-374

McKean, Charles (1987) *The Scottish Thirties: an architectural introduction* Scottish Academic Press, Edinburgh

McKenna, Kevin (2013) 'Scotland has the most inequitable land ownership in the West. Why?' The Observer Saturday 10 August 2013 (http://www.theguardian.com/uk-news/2013/aug/10/scotland-land-rights) 26 February 2018

Mitchell, W.J.T. (2002) Landscape and power, second edition University of Chicago Press, Chicago

Morrison, John (2003) *Painting the nation: identity and nationalism in Scottish painting, 1800-1920* Edinburgh University Press, Edinburgh

Mumford, Lewis (1949) 'Monumentalism, symbolism and style' Architectural review 105 (628), April 1949 173-180

Nash, Paul 1941 *The Battle of Britain* painting image © IWM (Art.IWM ART LD 1550) (https://www.iwm.org.uk/collections/item/object/20102) Accessed 25 February 2018

Nora, Pierre (1996) Realms of memory: rethinking the French past, Volume I: Conflicts and divisions Columbia University Press, New York

Normand, Tom (2000) *The modern Scot: Modernism and nationalism in Scottish Art 1928-1955* Ashgate, Aldershot

Nye, David E. (2000) *Technologies of landscape: from reaping to recycling* University of Massachusetts Press, Amherst

Otter, Chris (2010) 'Locating matter: the place of materiality in urban history' in Tony Bennett and Patrick Joyce, eds *Material powers: cultural studies, history and the material turn* Routledge, Routledge 38-59

Paulsson, Gregor, Henry-Russell Hitchcock, Willam Holford. Sigfried Giedion, Walter Gropius, Lucio Costa and Alfred Roth (1948) 'In search of a new monumentality' (Symposium) *Architectural Review* 104 (624) 117-128

Payne, Peter L. (1988) The Hydro: a study of the development of the major hydro-electric schemes undertaken by the North of Scotland Hydro-Electric Board Aberdeen University Press, Aberdeen

Perchard, Andrew (2012) *Aluminiumville: government, global business and the Scottish Highlands* Crucible Books, Lancaster

Plan for Post-War Scotland (1941) Scottish Labour Party

Rackwitz, Martin (2007) Travels to Terra Incognita: the Scottish Highlands and Hebrides in early modern travellers' accounts c. 1600 to 1800 Munster: Waxmann

RCAHMS Archives (https://scotlandsplaces.gov.uk/digital-volumes/rcahms-archives)Accessed 27 February 2018

Rolston, Holmes, III (2017) 'The Anthropocene! Beyond the natural?' in Stephen M. Gardiner and Allen Thompson, eds *The Oxford handbook of environmental ethics* Oxford University Press, Oxford 62-73

Robertson, Frances (2014) 'Electric pastorale' The Drouth Close Issue Volume 47 January 2014

Smith, Sheenah (1988) Horatio McCulloch 1805-1867 Glasgow Museums and Art Galleries, Glasgow

Stamp, Gavin (1977) Silent cities: an exhibition of the memorial and cemetery architecture of the Great War Royal Institute of British Architects, London

Wightman, A.D. (1997) Who owns Scotland? Canongate, Edinburgh