Article:
Harrison Moore, A (2018) Designing Energy Use in a Rural Setting: A Case Study of Philip Webb at Standen. History of Retailing and Consumption, 4 (1). pp. 28-42. ISSN: 2373-518X

https://doi.org/10.1080/2373518X.2018.1436221

3. Designing Energy Use in a Rural Setting: A Case Study of Philip Webb at Standen

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Standen, built between 1891-4, was intended as the weekend retreat of the newly monied couple James and Margaret Beale. It is known as the first country house to have had electric lighting fully integrated into its interior design plans. Such radical technological innovations in energy supply and use, detailed in the extant building specification, is particularly in need of explanation as Standen was designed by the Arts and Crafts architect, Philip Webb, widely known for his 'natural' designs and anti-modern aesthetic. Working closely with his clients, Webb designed not only the electrical system, but specified a range of sustainable processes for energy supply. As we will see, Standen not only incorporated the newest technologies, but its remote rural location meant that the house itself remained necessarily self-sufficient; both new and old sources of energy were therefore tied in some significant ways to both local environments and age-old patterns of energy use. This article will offer a close reading of the building specifications, and Webb's associated letters and diaries, to explore the energy transformations and consumption choices built into Standen, providing a detailed look at the dynamic intersection of continuity and change embodied in the early stages of energy modernization in one influential rural home.

Keywords: Standen; Webb; Electricity; Energy; Arts and Crafts

Introduction

This article will focus in on a very specific and localised example of the social and material practices of rural energy supply and consumption at a nineteenth century country house, Standen, East Grinstead, in Sussex (built 1894-8), located on the site of a medieval farm in the South of England.[1] Philip Webb, the architect who created solutions regarding a new supply of energy on this property, offers us an interesting example of an Arts and Crafts designer developing technical solutions for the supply of electricity and water on the site. His work also provides a case study of rural self-sufficiency, for the house was not connected to the national grid until April 1936, after forty years of electrical use.[2] The National Trust in England, which now owns and runs the house as a heritage site, is currently looking at ways to solve some of its energy challenges, in terms of both cost and consumption, including rising bills, an over-reliance on the big six energy suppliers, the need to be environmentally friendly and reduce carbon footprints. This article suggests that the history of one of their properties at least, Standen, holds the promise of future solutions.[3]

Energy Transitions in the late Nineteenth Century

The social composition of the landowning classes in England in the second half of the nineteenth century was rapidly changing. As has been well documented by Joseph Mordaunt Crook, men who had made fortunes in commerce, banking and industry looked for country seats in reasonable sized estates in which to entertain their visitors.[4] They did not, however, have the traditional obligations of the country landowner to their staff and tenants and, as such, were the most likely group to take up the new technological developments to help their homes function.[5] Likewise, the major structural alterations required to install the latest forms of technology in old properties, often delayed their adoption, 'so the most striking examples of innovative technology are generally in houses that were built or rebuilt' in this period.[6] These were the homes funded by what the Liberal politician, C.F.G Masterman, described in 'The Condition of England' in 1909 as the '"super wealth" as accumulated in this country… in the last 30 years'.[7] Clive Aslet has divided country house owners in this period into two: 'those who wanted much the same as before, but smarter, glossier, equipped with the most up to date evidences of scientific wizardry' describing these owners as tending to have a rather old fashioned attitude to land ownership as a means to social advance; and the type of owner who wanted a country house because the country embodied a social order they saw disappearing.[8] The latter category, in which I place the Beales at Standen, wanted to benefit from the new possibilities offered by power from gas or coal, although these energy forms were still combined with oil and candlestick, a transitional mix of traditional and modern that adds credence to Aslet's comment about those who wanted to hold onto a sense of the security of the past while embracing the new.

Without access to the electrical grid, the forward-looking country house owner in the 1880s had to choose between building a gasworks and building a generating station and this decision process is clearly reflected in Webb's notebook comment while working at Standen on 25 August 1894, 'Electric installation cost say £900 – 2 ½ horse steam engine. If gas available – reduce cost and dirt'. The gas companies, under pressure from electricity, had set about wooing the house owner in the 1880s, and domestic gas lighting became a feasible and attractive proposition for the urban middle class and, from 1900, the working class.[9] Yet, electricity was set to conquer, especially amongst the well off. Even efficient gas light was often regarded as only suitable for passages and servants halls.[10] The future lay with electricity, although in 1919 only half million houses, 6% of the total, were wired for electricity.[11] Standen therefore was an example of a pioneering approach to energy supply in the history of country houses and rural homes. This fits with the rhetoric in the key

publication for the land owner and the wannabe nouveau riche, *Country Life,* a periodical that grew out of the Arts and Crafts movement, and was a regular site for discussions of the work of Webb. In 1910, the same year when the Magazine published its first article on Standen, it stated that,

> The rich man with a very large establishment will almost certainly declare in favour of electricity, which in his case will probably give the lowest working costs, while his less wealthy neighbour will most likely install air-gas or acetylene…the amount of attention required to operate an air-gas or acetylene plant is very small, and it is not unusual to make it part of the housemaid's duty. In the case of electric light the writer has never heard of this being done; male attention of some sort seems to be required, even if it is only such the bootboy can give. Gardeners can usually undertake the work quite successfully.[12]

The first public electricity supply station in England was established in Godalming, Surrey in 1881 but the venture soon proved unprofitable.[13] Early in the following year an electricity undertaking was set up in Sussex, in Brighton and so successful was the enterprise that the town can claim to have the longest continuous electricity supply in the world.[14] Nevertheless, in the 1880s and 1890s public electricity supply stations were still concentrated in the most densely populated and wealthy areas of large towns, for example in London supply stations were located in Mayfair, Kensington and Westminster. Large scale generation of electricity provided by power stations did not become possible or established until the early years of the twentieth century.[15] For country house owners and those living outside of the boundary of supply who wanted electricity the only option was to generate their own supply to help the country house function.[16]

Likewise water supply needed to be generated on site as there were not the connected water systems and organisations that we are used to today. Most houses had to pump it up from rivers, springs or wells to tanks in towers and roof spaces. As Marilyn Palmer and Ian West have documented, horse or donkey-powered pumps were employed from the sixteenth century. In the nineteenth century hydraulic rams were often used for this purpose, pumping water from rivers or springs at a fairly low head of pressure to a higher level, where it could be fed into the home at a pressure enough to feed pipes and taps.[17] The most well-known early example of using hydraulic power to generate both water and electrical supply is William Armstrong's experiments at Cragside in Northumberland, where, taking advantage of the steep geography of the site, a system of reservoirs and hydraulically powered pumps supplied sanitation, lighting, heating, fire protection and many other celebrated innovations. Armstrong fits Clive Aslet's description of the country house owners who looked to scientific

wizardry to deliver social advance. *The World*, an international publication described Cragside in 1900 as 'truly the palace of a modern magician'.[18] In contrast, Standen was the other type of house, not designed for ostentatious entertaining but 'for the comfort of those who live most of the day out of doors in muddy fields'and thus offers us an interesting comparative case-study of late nineteenth century approaches to energy supply and consumption.[19]

An Arts and Crafts Approach to Designing for Energy

Standen, built between 1891-4, was intended as the weekend retreat of the newly monied couple James and Margaret Beale, and has been cited as the first country house to have had electric lighting fully integrated into its interior design plans.[20] This radical technological innovation alongside many innovations in energy and water supply and use is particularly in need of explanation since Standen was designed by an architect who has been celebrated both in his lifetime and after his death as a founding father, alongside William Morris, of the Arts and Crafts movement. Morris and Webb looked to preserve historic building traditions and were responsible for the creation of the Society for the Protection of Ancient Buildings (SPAB), a key inspiration behind formation of the National Trust in the late nineteenth century.[21] The roots of the Arts and Crafts movement lay in an ideal of the medieval craftsman, and Arts and Crafts architects believed that methods of construction were more important, socially and morally, than end results.[22] As Webb's pupil and biographer, W.R. Lethaby stated, the Arts and Crafts vision of England that the architects and designers aimed to preserve and celebrate was one of 'old towns, tilled fields, little rivers, farms, churches and cottages'.[23] All extremes, whether of elaboration or bareness, were to be shunned in case they 'might seem affected posing and advertising', with Webb famously declaring, 'I never begin to be satisfied until my work looks commonplace'.[24]

While Webb had a very clear Arts and Crafts interest in the past, he embraced new technologies, detailing central heating, wind power, water filtration systems, speaking tubes and electric lighting in the specification and his notebooks and producing tailor made designs. In the design of these there was a keen sense of Arts and Crafts theories, including the use of natural forms, hand craftsmanship and the use of materials that helped emulate a sense of the past. All of these could be read as a continuation of the design conservatism seen in the work by many of the early electrical lighting designers and led by the desire of the inherently nervous early consumers of these new technologies.[25] By exploring Webb's ideas traced

through his letters, design specifications, notebooks and by looking at the objects and architecture that remain at Standen today, however, I want to track how a designer, seen by many as celebrating and preserving the past, could embrace the newest of technologies in energy supply and consumption. Rather than reading his designs as conservative and backward facing, I propose that he actively chose to borrow from the best ideas of the past in a way that demonstrated the Arts and Crafts ambition to use 'the old materials in the old "unhurrying way"' but at the same time 'sweet to all modern uses'.[26] In Jack's 'Appreciation of Philip Webb' written on his death in 1915 he commented that 'the half century during which Philip Webb lived and worked produced a greater number of changes in building methods and made more adventurous experiments in different styles than any other known to history. Webb was one of the first architects to set these changes in motion, little dreaming then into what a bewildering maze he was helping to lead the architectural designers of the future'.[27]

Webb, the Beales and a 'Progressive' Approach to the Past.

By 1891, James Beale was a well-established and wealthy London solicitor. Beale's family came from Birmingham and his greatest professional success was having the firm retained by the Midland Railway. Hence, this was a man who had profited from one of the great energy success stories of the century. His choice of location for his country home was most likely driven by the arrival of the railway link from London to East Grinstead in 1884. In 1890 Beale bought Great Hollybush, Standen and Stone farms just outside the town. The Beales knew at least three families for whom Webb had worked – the Ionides, the Alexanders and the Tomes.[28] The majority of his clients came from a fairly compact section of English society, closely linked by family ties and political interests, and in the habit of exchanging country house hospitality. Within this circle Webb's work was well known and his services were in such demand that he could choose his clients. In a letter refusing a commission for a large country house Webb wrote, '…for some time past I have decided not to undertake to build for anyone who is not conversant with my work and able to judge of what would be the finished effect of that which I should agree to carry out'.[29] The Beales, on the other hand, seemd to be fully conversant with Webb's ideas and in the extant letters about the commission at Standen, we can see him puzzling through questions of energy supply, water, windmills and the like, in conversation with his clients.

With his Janus-faced approach to energy supply in building design, one that looked back to an idealized 'natural' past and forward to a modern streamlined world, Webb occupies a significant place in modern architectural history. Webb's (1831-1915) architecture and design has been described by Shelia Kirk as having had 'the greatest influence upon the Arts and Crafts movement'.[30] Webb did not reference the movement when describing his work, as he wished to avoid being connected to one, specific architectural style.[31] His aesthetic philosophy, however, that venerated the Ruskinian ideas of historic preservation and vernacular tradition, truth to materials and function, commonsense, practicality and honesty, have subsequently been seen to exemplify the Arts and Crafts movement. In the same vein, Webb refused to allow his name to be put forward to the Royal Academy, nor did he become a member of any professional association. He contented himself with membership of the Royal Sanitary Institute and the Society for the Protection of Ancient Buildings, demonstrating his keen interest in building traditions and the technologies of supply.[32] Webb saw architecture as a tradition of good building based on local usage, local materials and local traditions. He thought an architect should be more concerned with doing a thorough job than showing off his cleverness or knowledge.[33] His first commission was to build a country home for his friend and colleague, William Morris. This resulted in the Red House (1858-9) which is now widely regarded as the first Arts and Crafts building.[34] Webb was born and trained alongside Morris in Oxford, in the architectural practice of G.E. Street, a 'church architect in the Gothic style'.[35] Both Morris and Webb were deeply influenced by reading John Ruskin's book *The Stones of Venice*, particularly the chapter on 'The Nature of Gothic', and drawing on the moral and political philosophy of this text, they set out together to create an architecture and design philosophy that aimed to correct what they perceived as the ill-effects of the industrial revolution on society. Through this shared ambition they established the 'Firm', later known as Morris and Company. The Red House marked the beginnings of Webb's architectural practice, set up in 1864 in No.1 Raymond Buildings, London, where he remained until retirement.[36] Standen was one of the last buildings he designed, ending a career which produced relatively few commissions compared to contemporaries such as Richard Norman Shaw, the architect of Cragside, and just 16 country houses. At Standen we can see the culmination of his thinking and practice in architecture, combining a celebration of the place and traditions of the site in its reverence for the medieval buildings already there and its use of local, vernacular building materials and techniques. George Jack, his one-time pupil, wrote in his 1915 obituary, that Webb removed architecture from the architect's office to the builder's yard and the craftsman's workshop'.[37] It is therefore interesting to consider

how he responded to the modern ideas of the electrical and sanitation engineer in a country house design that marked the pinnacle of his architectectural career.

Two characteristic features of Webb's work can be clearly seen in his design of Standen: his remarkable ability to combine old and new and his close attention to the specifics of environment, embracing a deep sensitivity to the rural. Webb's focus at the site was on the original tile-hung farmhouse, and throughout the design he was inspired by local building traditions, carrying out a close inspection of nearby farms, barns and small houses.[38] W. R. Lethaby concluded that 'Webb loved to anchor his new works up to something which had age and character' and he conscientiously celebrated, preserved and incorporated the original buildings that he found on his first visit to the site on March 20, 1891, into the overall aesthetic of the property.[39] In the first *Country Life* article published on the House in 1910, while Webb was still alive, his buildings were celebrated as 'designed to relate to their environments, both historically and geographically'. This approach was the same when it came to energy supply.[40] Despite the fact that the location of Standen was chosen due to the arrival of the railway, it was still very much a rural environment. Webb worked with the site as found, looking for solutions to help power the house in the landscape. As the author of the article goes on to comment, 'It may at first appear that the plan has an irregularity almost wayward, and that the building groups in a somewhat rambling fashion…the seemingly casual lay-out is the result of a large and thoughtful study of the conditions', concluding that 'Some men will wrack the ground to fit some scheme of building preconceived, here by slicing away the side of a hill and there by banking up a slope with great retaining walls. It seems to have been the pleasure of Mr Webb to make Standen fit the land on which it seems to grow'.[41] By focusing on his intructions to the builders and engineers regarding water supply and the supply of electricity, Webb's intent to allow the landscape to shape his ideas, rather than attempting to tame it to the architect's will, is clearly illustrated:

Water at Standen

In his solution to water supply, for example, we can see Webb combining a deep understanding of the historical and local building methods and new technologies for wind and hydro power.One of the most noticeable aspects of Webb's design for the House was the lime rendered, pebble-dashed white water tower, located at the heart of the backward L shaped plan. John Brandon Jones, an architectural advisor to the National Trust in the 1980s and 90s, wrote that, 'A very important point not noticed is that the Tower is placed so that it can be

seen straight ahead as you come down the drive passing the cottages. I am sure that this is no accident. Webb was following the romantic tradition in giving a glimpse to indicate the approach to the great house, which then disappears until you rediscover it after rounding the minor buildings'.[42] Here the idea of the 'romantic' is closely tied to the literature on the Arts and Crafts country house, aimed at indicating, in Clive Aslet's words, a simple, old fashioned 'less artificial, more genuinely rural existence', grounded in a truth to the past.[43] Mark Girouard has highlighted the designer, A.W.N. Pugin's embrace of the water tower. Pugin's influence on the Arts and Crafts Movement has been well documented, and he cited the water tower as an example of functional aesthetics, contrasting it with the gothick fantasies of the baronial architecture of the early nineteenth century where towers were built to artificially recreate the castles of the past. By using such architectural features for very practical purposes such as water supply, plan could be seen as coming before appearance.[44] This fits with Webb's wider approach to the aesthetics of power supply and particularly lighting. I have elsewhere explored the aesthetics of the lights at Standen, emphasizing how they harkened back to and celebrated tradition while looking forward to the newest technologies, and so will not dwell on this here. I will simply note that, in the same way as his specifications for energy supply in the countryside were grounded in practicality and tradition, likewise were his designs for the way his lights looked and functioned in the home.[45]

The practical justification for the tower was the necessity to provide large water tanks at a high level but it also plays an important part in the composition of the group of buildings, holding together the two parts of the house and pinning them firmly to the site, demonstrating Webb making beauty from necessity. He noted on the 11th of April 1891, when he first visited the site of Hollybush with Mr Beale, that sand and stone could be found on the estate but that water supply 'must be a difficulty but it may be managed from the lower ground'.[46] Webb's notebook also highlights that 'Mr Beale had been thinking of a windmill –must have good rain tanks'.[47] 'Water supply' and the 'outfall of drainage' were also of concern on October 13, 1891 when Webb visited again. As 'the weather was, during the whole of my time there, very wet and stormy' he knew that he could rely on rain water![48] On 7 November 1891, while Webb was 'testing [the] position of house' with Mr Beale and family he again 'looked about for water supply'. His notes included the comment that 'Mr Simpson (the gardener) believes in the source of the Spring tapped at the N W corner of new bowling green' and he concluded that he would 'Probably try for water by …well, or boring, in the

small pasture meadow on the North side of the lane, about midway between the House and the wheatfield as if, we got water, a windmill pump would have good wind exposure there'.[49] The Specification required the formation of 'three cisterns in the top storey of the Tower of 1 ½ sawn slate jointed in red lead'.[50] These slate tanks were split into one to supply hard water for drinking and one to supply soft water for washing. The drinking water came from a reservoir in Jack and Tommy field below the house right up until after the Trust took over in 1973. It was pumped from there, under the drive, and up the quarry rocks to the top above the house where it was stored in a large tank (add diagram).[51] The height gave the water a head in order to supply the taps in the house. There was also a second smaller tank that supplied the cottages.[52] To supply soft water to the House for washing (of bodies and clothes), all the surface water was collected from the roofs of the house. Webb designed brown terracotta drain heads in order to protect this water supply from dirty rainwater bouncing back from the cobbles of the stableyard.[53] All the roof water flowed from these drains into a tank in the Mulberry lawn, right by the House. From here it overflowed into a tank at the top of the vegetable garden, and then into a tank in the lower vegetable garden. This process meant that it was being naturally filtered. Beale's requested mini windmill then powered a pump to push it back up to the House where it filled the second slate tank in the water tower, ready to supply the House.[54] (get copy of photograph of windmill in the Barn) Webb only ever installed two bathrooms in the House for a large family. He said this was due to the fact that people would rather bathe by the fire in their dressing rooms, but it was probably because there was not enough pressure on the soft water supply. The tank of roof water under the Mulberry Lawn also had a secondary value for the House; fire prevention, an important consideration in a house still planned to be powered by the naked flame of candles and fires, plus the terrifying new technologies of electricity. In the 1980s, the gardener, Robert Ludman, remembers the Fire service testing this supply and having enough water to fire an unlimited supply of water right over the House.[55]

Electricity at Standen

From the start of the commission, when Webb scoped out the site, the need for a locally sourced energy supply was pressing and the presence of water and a steep sloping geography made some sort of hydro supply the first thought.[56] As we have seen, this soon switched to a consideration of the relative merits of gas and electricity, with electricity winning out despite being the more expensive option. Graeme Gooday and I have discussed elsewhere the battles between the gas and electrical engineers, which led to gas supply being portrayed as

unsuitable for the country home, given its propensity to produce dirt and corrode fine furnishings.[57] Once electricity was decided upon, Webb's account of 26 June 1893 details him visiting Hollybush to meet Mr and Mrs Beale and Mr Robert Beale, electric engineer to settle 'various things'. This is supported by Webb's own notebooks for the commission, which also cite the meeting with Robert Beale, the 'Engineer's foreman', on June 26 1893, to arrange 'with them for wires and lights'. In June 1892, in his specification for Standen, Webb wrote 'The heating, stoves and ranges and electric lighting are not included in this contract but for the sum of £50 is to be provided in the contract for the attendance of these trades men and also for fixing the channel for the hot water pipes'.[58] The 110 watt supply of electricity at Standen was stored in batteries in the barn, a tudor building that Webb had preserved and celebrated in his designs for Standen, providing a living example of him looking backwards to move forwards. The electricity was then fed to the House via wires running under Goose Green.[59] A note in the archives at Standen recalls that the chauffeur's assistant 'was responsible for the donkey engine in the engine house next to the big barn. This produced, in a room lined with battery jars, all the electricity for the house, chuffing merrily and giving out little smoke rings through its chimney'. Evidence of this generator survives. Maureen Dillon has questioned whether the 'donkey engine' was the key source, as this type of engine was not usually used for generating electricity.[60] She suggests that it may have been for agricultural use rather than the generation of electricity. Notwithstanding that, a former staff member at Standen has recalled that the generator was used for both purposes – he had located the wires running from the barn to the House buried in under the garden.[61]

In other articles I have focused on Webb's design philosophy as reflected in the designs for the lights, shades and bulbs in the rooms at Standen.[62] But we can also see Webb's design philosophy played out in his plans for the most prosaic part of lighting - the wires and plugs that connected the lights to the energy supply. In his designs, the wires are not hidden, but celebrated, with glass and copper curls drawing the eye to the flex that connects to the lampshade and bulb hanging from the bracket and decorative wall-plate [image?]. One of the key advantages of electric lighting over gas, as proposed in the literature written by its most fervent promoters, was the abilty to direct the light in multiple ways, and especially the option to have it hanging down over a room. Webb's design both embraced and celebrated this particular technological advance. When electricity was installed at Standen, appliances were only just starting to be developed and therefore there was little need for wall sockets. Virtually all electrical appliances could be plugged directly into the overhead light sockets as

they were fitted with bayonet ended plugs.[63] At Standen there is evidence to suggest that wall sockets were installed in 1894 to be used for table and standard lamps. In 1891 Captain Ironside Bax, the manager of the Westminster Electric Supply Corporation, considered that 'A wall plug or connector for a standard lamp is very convenient and a great luxury'.[64] On the wall outside the North Bedroom we find Webb's solution to a key part of the system of supply. Set within the wood panelling of the hall, so discrete it almost goes unnoticed, is a box containing the original main electricity switches. 'Whether Webb was intent on hiding such modernity, or in treating it with due respect we shall probably never know'.[65]

Webb , Electricity and Class

As much as we have explored the energy supply to the homes of the wealthy, it is important to consider those who also still lived and worked in the country house at the end of the century, the servants. Webb is well known as an architect who thought as carefully about the spaces that housed servants as those for the patron. It is not known for sure whether the servants bedrooms at Standen had electric lighting before 1935 when the whole system was upgraded in preparation for electricity to be supplied by the East Grinstead Urban District Council. In 1894 it would have been unusual for servants' bedrooms to be lit by electricity and would have indicated an impressive level of wealth and generosity on the part of the family, but Webb had previously demonstrated his thoughtfulness about servant accommodation. Mrs Wyndham, the client of another of Webb's commissions, Clouds, East Knole, Salisbury (1880s), remarked after a fire had destroyed the main block and she had to be temporarily housed during the rebuilding that 'It is a good thing that our architect was a socialist because we find ourselves just as comfortable in the servants' quarters as we are in our own'.[66] The way Webb laid out in the plans at Standen meant that the first wing that one comes to on arriving at the house is the servants' wing, celebrating a space that architects frequently looked to hide away. Borlase Matthews writing in 1909 stated that,

> The lighting of servants bedrooms is a debateable point, as it encourages reading there and consequent long hour burning. Servants are also apt to learn a little electrical engineering, just sufficient to be able to change the low for high candle-power lamps from other parts of the house. Still, the fire risk is greatly reduced if electric light is installed in these rooms, and therefore it may be wise to do so on this account. In some houses the lights in the servants bedrooms are so wired that they can be controlled by a switch in the dressing room or similar place, so that the consumer can extinguish their lights when he goes to bed himself.[67]

W.A.S.Benson, who was responsible for much of the electrical lighting equipment supplied to the Beales, advised 'The lights in the servants' bedrooms can all be on one circuit

controlled by one switch (in addition to the switch in each room) fixed in the best bedroom, so that all these lights may be cut off at a given hour every evening and during the day'.[68]

Conclusion

Webb sought a modern, developing architecture with tradition as its foundation. 'If a stone had to be replaced in order to save a worthwhile portion of wall or window then Webb insisted it should be frankly new. It must not be artificially aged. To do this would be false; it would be imitating workmanship of the past of which the methods are no longer fully understood'. [69] Webb's biographer, Shelia Kirk, stresses that Webb was a realist, and his domestic architecture was derived from an expression of the building method and of the requirements of modern living.[70] Hence, an architect steeped in the medieval and vernacular could comfortably design for most modern the technologies of energy supply.. 'The keynote of Webb's thought was', according to Noel Rooke who knew him during the last fifteen years of his life,' that his buildings must be modern of his day – he did mean any anticipation of modernistic – but modern in using then current methods and local material according to the best ordinary practice'.[71]

Despite his interests in truth to materials and respect for locality, Webb was prepared to make compromises in structure and construction. Standen, for example, has a concealed steel frame.[72] He was not afraid to invest in modern principles of design both externally and internally when it came to embracing new technologies. That said, he was not prepared to embrace all of the new technologies available to the architect at the turn of the century. As George Jack remembered in his *Appreciation*, on asking Webb 'whether he did not think that there might be some future for the new reinforced-concrete method of building if some appropriate kind of architecture could be invented for it, "Perhaps so" he said "but Jack, its not architecture"…I expect he was right. To cast buildings in moulds like pots and kettles may be scientifically the right kind of thing to do, but no one can call it a romantic process'.[73]

George Jack's, *Appreciation*, written on Webb's death in 1915, offers a useful conclusion to this article's consideration of Standen as both a model for the adoption of new technologies in the nineteenth century but also as a model for systems of self-sufficiency and sustainability that are currently being championed as solutions to contemporary, grid-supplied energy problems. 'I well remember the kind of mental shock which came to me when first I became acquainted with his work; it was like having a flashlight suddenly thrown upon the eyes,

blinding at first, but soon lighting up many dark places'.[74] In his pupil, Lethaby's 1935 celebration of his master's *Work* he described Webb as 'in essence a spark of creative spirit', using an apt electrical metaphor to describe Webb's influence.[75] Webb retired from practice in London just two weeks before the death of Queen Victoria and he thus marked a move to the new generation of new technologies in the rural home in turn of the century England, but he also demonstrated useful methods for combining the practices of the past with the needs of the future, and, as such, provides a lesson for those considering the challenges of going 'off grid' today. As the National Trust looks again to take the historical houses that they have charge of off the grid, and find sustainable ways to provide power, we can see in the case study of Webb's solutions at Standen, that there are clear historic precidents and possibilities, and that the infrastructure for energy supply often still remains on site, offering the chance to look back to move forward in terms of energy supply in the countryside.

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[1] This article forms part of a wider project, 'Electrifying the Country House', where Graeme Gooday and myself have focused on three specific case studies of early electrification in England; Cragside, in Northumberland, Lotherton Hall in Leeds and Standen. See http://www.electrifyingthecountryhouse.org. Some of the research that formed the basis of this project has been published in two previous articles, Graeme Gooday and Abigail Harrison Moore, 'Decorative Electricity: Standen and the Aesthetics of New Lighting Technologies in the Nineteenth Century Home', *Nineteenth Century Contexts,* 35:4 (September 2013): 363-83 and Graeme Gooday and Abigail Harrison Moore, 'True Ornament? The Art and Industry of Electric Lighting in the Home, 1889-1902' in *Art versus Industry?,* ed. Kate Nichols, Rebecca Wade and Gabriel Williams (Manchester: Manchester University Press, 2016). This edition of essays, with its focus on energy in the countryside, has allowed me to publish new research which develops Gooday's and my arguments by focusing on Webb's specifications and solutions for energy supply to the House, including water as well as electricity, rather than lighting design, to explore the need for self sufficiency in the country house, and Webb's Arts and Crafts innovations in the light of this.

[2] Maureen Dillon, 'A History and Survey of the Lighting at Standen' (unpublished manuscript, January 2010), 4. Although Dillon did not publish this work, it remains a key source for those interested in lighting in National Trust houses and was part of a wide survey that Dillon, as historic lighting advisor to the Trust, was commissioned to complete in many of their houses.

[3] See https://www.nationaltrust.org.uk/news/30-million-investment-in-a-sustainable-future. For particular case studies of sustainable approaches to energy supply in National Trust houses, see for example Blickling Estate, Norfolk, Upton House, Warwickshire and Croft Castle, Herefordshire.

[4] Joseph Mordaunt Crook, *The Rise of the Nouveaux Riches: Style and Status in Victorian and Edwardian Architecture,* (London: John Murray, 1999).

[5] For a wider discussion on technical change in the country house in this period see Marilyn Palmer and Ian West, 'Nineteenth Century Technical Innovations in British Country Houses and their Estates', *Engineering History and Heritage*, Vol 166, Issue EH1, 36-44.

[6] Ibid., 39.

[7] C.F.G Masterman in 'The Condition of England' (1909) quoted in Clive Aslet, *The Last Country Houses,* (New Haven and London: Yale University Press, 1982), 1.
[8] Aslet, *The Last Country Houses*, 1.
[9] See Graeme Gooday, *Domesticating Electricity: Technology, Uncertainty and Gender, 1880-1914* (London: Pickering and Chatto, 2008) and Maureen Dillon, *Artificial Sunshine: A Social History of Domestic Lighting* (London: National Trust Books: 2002) for a much more detailed analysis of the debates between gas and electricity in the late 19th century home.
[10] See Gooday, *Domesticating Electricity*.
[11] Information drawn from a lecture given by David Beevers at the Royal Pavilion, Brighton. I am grateful to David for access to his lecture notes. This exact statistic comes from Roger Fouquet and Peter Pearson, 'Seven Centuries of Energy Services: The Price and Use of Light in the United Kingdom (1300-2000)', *The Energy Journal,* 2006, 27:1, 2006, 139-77, 165: 'By as late as 1919, only around 6% of households were wired to an electricity supplier'.
[12] Maurice Hird in Lawrence Weaver (ed.), 'The House and its Equipment', (London: Country Life Publishing, c.1912).
[13] Dillon, 'A History and Survey', 3.
[14] Ibid.
[15] Ibid.
[16] Mark Girouard, *The Victorian Country House* (London: Yale University Press, 1979), 141-146.
[17] Palmer and West, 'Nineteenth Century Technical Innovations', 39-40.
[18] *The World*, quoted in the *Newcastle Journal*, December 28, 1900.
[19] Neville Lytton, *The English Country Gentleman*, (London: Hurst and Blackett, 1925), 28.
[20] For a discussion of this assertion, see Gooday and Harrison Moore, 'Decorative Electricity', note 1, 363.
[21] For a wider discussion of the aesthetics of technology and Webb's Arts and Crafts credos, see Gooday and Harrison Moore, 'Decorative Electricity', and Gooday and Harrison Moore, 'True Ornament?'.
[22] Clive Aslet, *The Last Country Houses,* (New Haven and London: Yale University Press, 1982), 8, 155.
[23] W.R. Lethaby, *Philip Webb and his Work*, (London: Raven Oak Press, 1979), first published 1935 by Oxford University Press), 156.
[24] Lethaby, *Philip Webb and his Work*, 136. See also Aslet, *The Last Country Houses*, 143.
[25] For a wider discussion of design conservatism see Gooday, *Domesticating Electricity,* particularly Chapter 6, 'Aestheticising Electricity'.
[26] Aslet, *The Last Country Houses*, 155, drawing from Robert Lorimer's description of the Arts and Crafts country house, Munstead Wood.
[27] George Jack, 'An Appreciation of Philip Webb', *The Architectural Review,* 38 (1915), 1.
[28] See Mark Girouard, *The Victorian Country House* (London: Yale University Press, 1979), 381.
[29] John Brandon-Jones, 'Philip Webb' in *Victorian Architecture,* ed. P Ferriday (London: J. Cape, 1963), 264.
[30] Sheila Kirk, *Philip Webb: Pioneer of Arts and Crafts Architecture*, (Chichester: Wiley and Sons, 2005), 6.
[31] Ibid., 6
[32] John Brandon-Jones, 'Philip Webb', 250.
[33] Mark Girouard, 'Standen, Sussex-1, The Home of Miss Helen M. Beale', *Country Life,* 26, Vol 147 (February 1970), 495.
[34] Although, as Sheila Kirk points out, it was completed a quarter of a century before the term Arts and Crafts was coined by its younger practitioners. Kirk, *Philip Webb,* 6.

[35] Lethaby, *Philip Webb and his Work*, 13.
[36] Ibid, 87.
[37] Kirk, *Philip Webb,* 295.
[38] As is excellently illustrated in Webb's notebooks, entitled 'Hollybush House' or 'Standen (Hollybush)' , and recording Webb's activities from 1891-1894, in the possession of John Brandon-Jones in 1984. These can be accessed via the archives held at Standen.
[39] Lethaby, *Philip Webb and his Work*.
[40] 'Standen East Grinstead, A Residence of Mr James S Beale', *Country Life,* May 7, 1910, 666.
[41] Ibid., 668.
[42] Correspondence from John Brandon-Jones to Harrison Moore, 28 April, 1993.
[43] Aslet, *The Last Country Houses*, 8.
[44] Girouard, 'Standen, Sussex-1', 30-31.
[45] See Gooday and Harrison Moore, 'Decorative Electricity', and Gooday and Harrison Moore, 'True Ornament?'.
[46] See Webb's notebook entry, April 11, 1891.
[47] Ibid.
[48] Webb's notebook, October 13, 1891. Such inclement conditions could have also had him thinking about water collection as a possibility for supply, as well as using the conditions made possible by the topography of the site. This plan is evidenced in Webb's comment on August 14, 1893 that 'Mr Beale wanted plenty of rain-water tank reserve'.
[49] Webb's notebook, November 7, 1891. He also 'examined the fields at the N.E side of the house, and concluded that the main drain of the house might well be carried to the "wheat field" just beyond the crook of the lane'.
[50] *"Holly Bush" East Grinstead Sussex, Specification,* June 1892, Instructions to 'Plumber', 45.
[51] Robert and Frances Ludman, former gardeners and tenants at Standen, interview by Harrsion Moore, July 2015.
[52] Letter from George Jack to Mr Beale, April 16, 1902. He says that although he 'has not done anything yet to the soft water supply scheme', he shall 'make a drawing of the specification for the tanks…and get a price for that – this I must do very carefully I see, as there are difficulties in it which want consideration'.
[53] Ludman interview.
[54] As we can see in a photograph now exhibited in the Barn at Standen.
[55] Interview with the Ludman interview.
[56] See Webb's notebook entries, April 11, October 13, and November 7, 1891. On November 7, 1891, he 'looked about for water supply', stating that 'Mr Simpson believes in the source of the spring tapped at the N.W corner of new bowling green…examined the fields at the N.E side of the house, and concluded that the main drain of the house might well be carried to the "wheat field" just beyond the crook of the lane…Probably try for water by siting well, or boring, in the small pasture meadow on the N side of this lane about midway between house and the "wheat field", as if we got water, a windmill pump would have good wind exposure there'.
[57] See Gooday and Harrison Moore, 'Decorative Electricity'.
[58] *Specification*, 41
[59] Ludman interview.
[60] Dillon, 'A History and Survey', 10.
[61] Ludman interview.
[62] See Gooday and Harrison Moore, 'Decorative Electricity'.
[63] Dillon, 'A History and Survey', 3.

[64] Ibid., 4-5.
[65] Judy Spours, 'Brick and Polish', *Traditional Interior Decoration,* (1987), 133-45 145.
[66] Quoted in Michael McEvoy, 'Webb at Brampton', *The Architect's Journal,* Vol. CXC, (October 25, 1989), 60.
[67] R. Borlase Matthews *Electricity for Everyone,* (London: Electrical Press, 1909), 15.
[68] W.A.S. Benson and Co, *Notes on Electrical Wirings and Fittings*, (London 1897), 19.
[69] Shelia Kirk and Rosemary J Curry, *Philip Webb in the North,* (Teeside: Teeside Polytechnic Press, 1984), 3, 8.
[70] Timothy Brittain Catlin, 'Review of Philip Webb, Pioneer of Arts and Crafts Architecture, by Shelia Kirk' in *Burlington Magazine*, CXLVII, (June 2005), 413.
[71] Noel Rooke, 'The Work of Lethaby, Webb and Morris' *R.I.B.A. Journal,* (November 1949-October 1950), 171-2.
[72] Edward R Ford, *Details of Modern Architecture,* (Cambridge, Mass: MIT Press, 1990), 129-131.
[73] Jack, 'An Appreciation of Philip Webb', 5.
[74] Ibid., 1-2.
[75] 'Great British architects: Philip Webb', *Country Life*, Vol CCV, No 2, (Jan 2, 2011), 78-9.