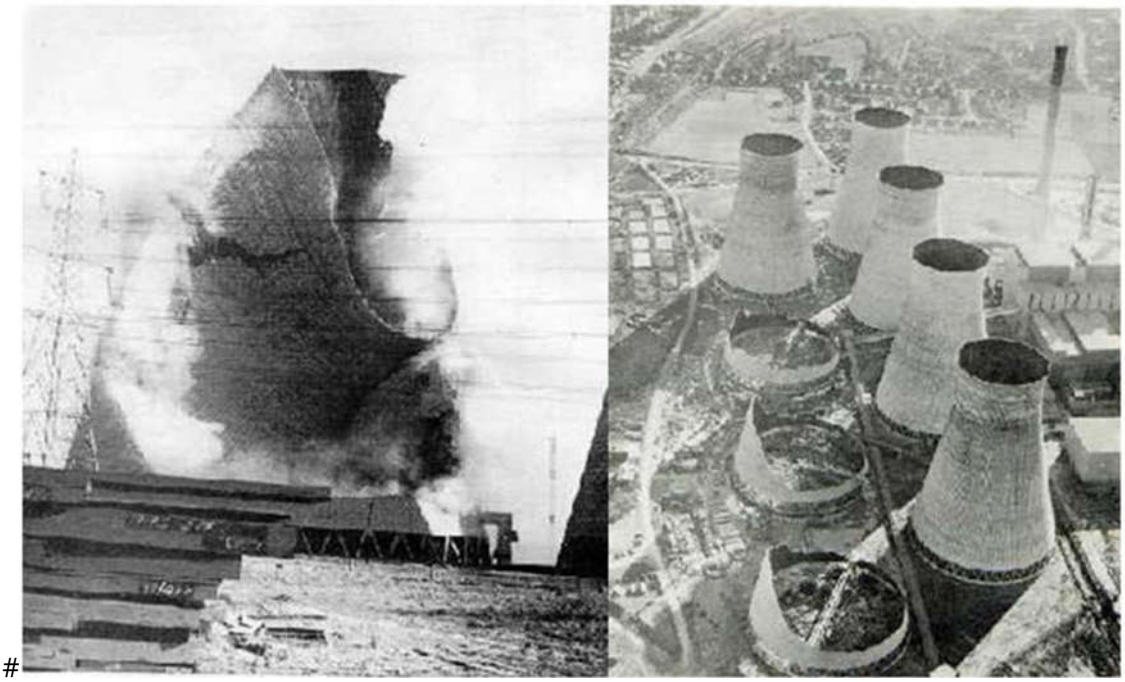
The Ferrybridge Cooling Tower project

A legacy for SSE

A side view of the proposed sculpture on a single tower at Ferrybridge.

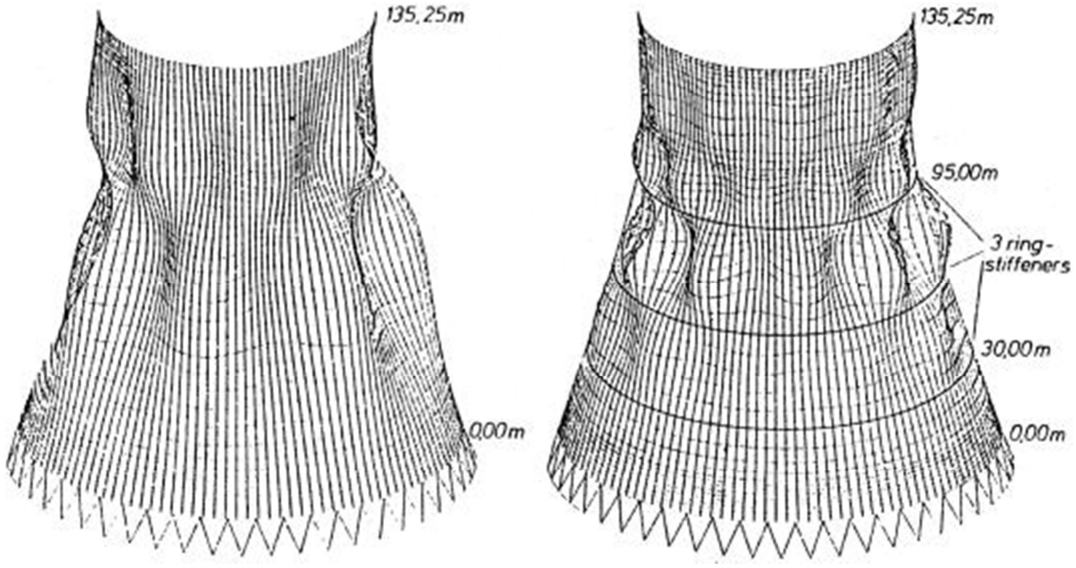
Ferrybridge Power Station is located in Yorkshire, along the A1M, at the junction with the M62. The map below provides a vague idea of where it is. It's very central and on the junction of two huge motorways. It is owned and run by SSE.

A coal powered power station has been there for almost 100 years. In 1965, eight new cooling towers were built, but in the same year, three of them blew down….



…..and in 1966 they were rebuilt (they actually look rather beautiful whilst broken!).

They had compensated for wind and weather, but not for the vortex created within the space between them. They therefore had to rebuild them with stiffeners, i.e. bands around them, in order to keep them stable.



In March 2016, Ferrybridge C Power Station ceased operations, as coal-powered power stations are now being phased out. A new multi-fuel power station has been built alongside and a second one is currently under construction.

It would be a terrible shame for all eight of the cooling towers to be destroyed as they truly represent a huge chunk of the history of the local community over the last 100 years. I have spoken with some local people and they are all deeply saddened by the loss of the power station and the towers.

They are iconic. You cannot miss them as you drive up either motorway and they can be seen for miles. When driving north (or south) they are a kind of a measure…. *."When we get to Ferrybridge…..",* and pilots of small planes navigate by them. They are close to Leeds, Bradford, Wakefield and Doncaster and are therefore close to a fairly large chunk of the population in that area.

Inspiration

After watching the video of the making of the Baha'i Temple in Chile and being deeply inspired by it, I was on my way north, driving past Ferrybridge and all of a sudden I could see waves of 'light' pouring over the sides of one of the towers, down the sides and weaving into the fabric of the tower itself. It was a most inspiring vision.

The Baha'i Temple in Chile is all about light. See the video at this link. http://bit.ly/2ppxsFZ

I have therefore been driven by a desire to turn one of these towers into a unique piece of art on the outside, whilst the inside would offer both a remarkable artistic experience and also an array of activities that would inspire people to visit, participate and revisit. It could be a blend of future, past and entertainment, offering a broad scope of interests and activities, revitalising the local community and offering much-needed jobs. Bear in mind each tower is 135 metres high and the diameter at the base is 88 metres. They are huge!

Proposal - History

The local community have been linked very closely with the power station for nearly a century. In fact, the River Aire is 'home' to three different power stations, all of which are coal fired, and likely to all be dismantled as the years progress (2025 is given as the final date). Thus a huge part of the heritage of the area would be lost. The collapse of three towers in 1966, a year after they were built, sent shockwaves across the world, though luckily no-one died in the incident. Needless to say, it made these towers some of the most 'visible' in the world as the information spread across the globe. Many papers and poems have been written about these towers. They are without doubt a major landmark, situated perfectly at a major motorway junction.

Sculptural idea – 'The Light from Within'

As the coal industry and these coal fired power stations have long been a part of the very fabric of Yorkshire society, it would be fitting to keep just one cooling tower in a

prominent visual spot as a reminder of that heritage. Situated at the junction point between the A1M and the M62 it is in a perfect place to be noticed by everyone who drives past.

When we look at a working cooling tower, we see steam in the form of mist above it, rising from within. The mist is generally bright, the water particles glistening in the daylight. Sometimes they even seem to merge with the clouds. This visual aspect is key to the proposal, so please bear it in mind as you read on.

In considering this project I have broken it down into several aspects;

a) The past – the history
b) The real attachment – i.e. the souls of those who see it as a part of their lives. The coal power industry has been at the heart of these communities for so long.
c) The future – a look to where energy generation is heading.
d) The use of Yorkshire-based technologies and organisations to realise the finished project.

Thus, the idea is to create something visual that embraces all of these aspects and brings the tower alive in a completely new and different way.

The vision

Below you will find images of drawings of the proposed idea. In effect, it would be three waves of 'light', looking a bit like fabric and loosely based on the idea of the mist and the nearby river, emanating from the top of the tower in three different directions (all round visual) which tumble down the sides of the cooling tower (a bit like a river) and as it tumbles, so it begins to merge with the cooling tower itself until the lower part of the cooling tower comes alive with light, like patterns of light on water (and looking like bolts of electricity). The 'fabric' would be made up of a steel holding structure, bolted into the sides of the tower and attached to that would be opaque glass (or a similar material). It would also have a 'stained glass' effect which in turn breaks up as it merges into the tower. During the day, the glass would glow in the daylight, whilst at night, projectors would beam lights onto the structure providing a vivid visual (and changeable) show, bringing the cooling tower to life.

On the inside, if you look upwards, the three 'waves' of light will fuse together into a glass dome. On looking up, using light projectors, viewers will see a fascinating array of light patterns, shapes and stories which should be quite beautiful to observe, inspiring awe at the beauty within. It will be a bit like a virtual reality world, without having to wear a VR mask. The projectors and other electrical equipment could possibly be powered by solar panels in a bank on one side of the car park.

The whole structure would have a deep spiritual significance; our inner strength, our sense of who we are, our sense of being all comes from the soul, rather than the

mind, the ego or from the world outside us. It will therefore be a reminder that the driving light that infuses us all comes from within. As Vivekanada once said, *'You have to grow from the inside out…There is no other teacher but your own soul'.*

Design of Sculpture

Below are drawings which give you an idea of what I have in mind. In essence, opaque glass (so that it does not shine in the eyes of passing drivers) or a similar lighter material, on a steel holding structure, pouring down the sides of the tower and then blending into the sides of the towers, like bolts of electricity (a reference to power), based on the way light plays on water (see image below). During the day it would stand out just by its eye-catching design, but at night it would come alive when projectors (surrounding the tower) would beam onto the glass the imagery of light pouring down the sides of the towers.

(See image above). From two different sides, here is the idea. Light pouring down the sides in 3 waves, breaking up and spiralling into the sides of the tower like electricity, or light dancing on water.

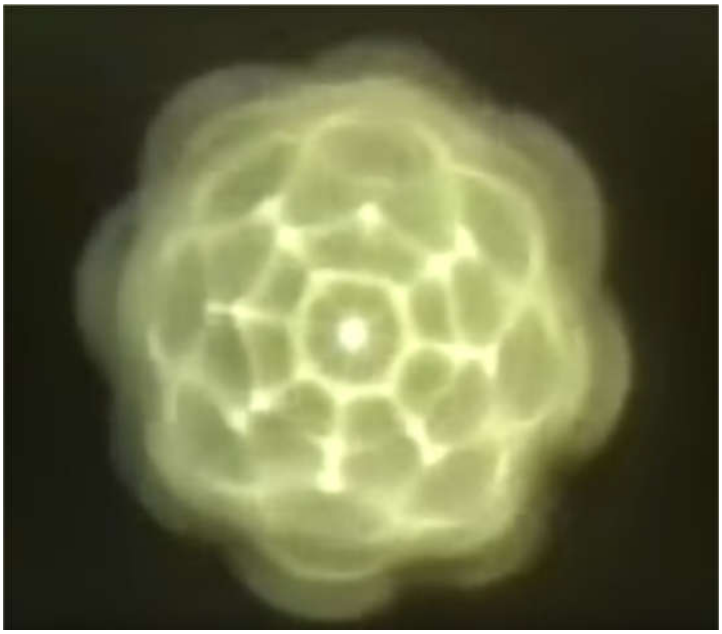
Below is the view over the motorway (see page 3 above) with all the towers, and then with the power station itself and 7 towers photoshopped out, allowing a vision of how well the tower would stand out by itself.

Below is the image of the sculpted tower photoshopped onto the current tower to give an idea of what it would look like from a distance (as seen on page 1). It stands out well against the buildings around it and would turn the tower into something new and refreshing, whilst still holding the 'history' of its original structure and purpose.

Inside the tower

For the inside, I propose a viewing platform in the centre for people to look up and get the very best view of an amazing array of light displays beamed upwards onto the dome and the sides of the tower, for example of the way frequencies adjust and change matter, a natural and very beautiful phenomenon. I have always been moved by the natural order of things, the way everything breaks down into such beautiful geometrical shapes, and that the golden section (so revered in art) is so much a natural part of everything around us. I am also aware that the ancients (Stonehenge, the Mayans and the Egyptians amongst many others) understood all this and used 'sacred geometry' to make/build/design their temples and cities in a very specific way.

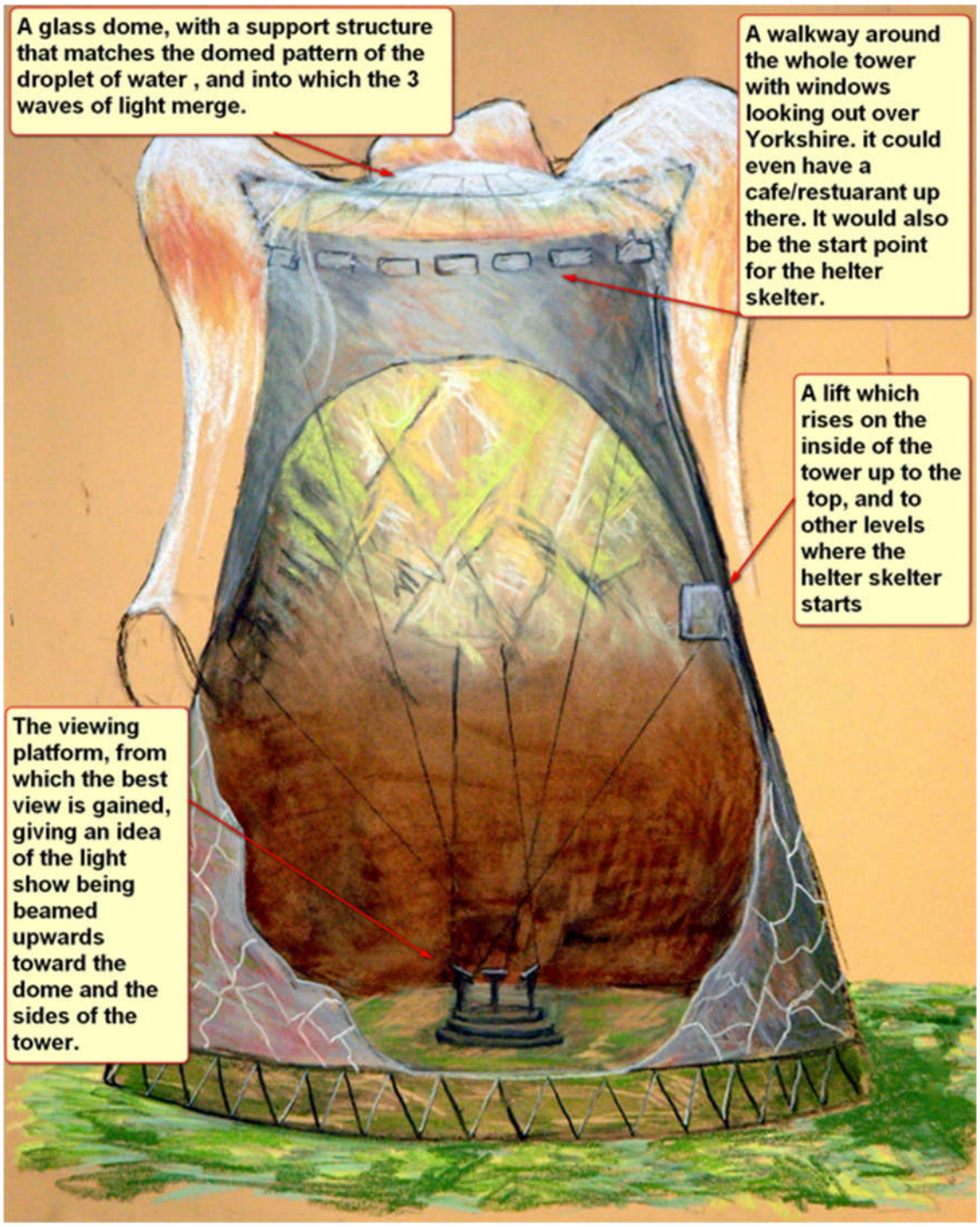
The easiest way to see how geometry and waves of energy play such an important part in the world around us is to watch what happens when different frequencies are projected onto a water droplet. As the waves increase in tempo, so the geometric designs created in the droplet become more and more complicated. It is a joy to watch. Watch this video. http://bit.ly/2DgjCYC.



This is a 'still' from the video (detailed above) at the most complicated moment, when the geometric design within the water droplet shimmers into a visual cone. It is quite beautiful. This video or similar imagery (amongst other visual creations) could be projected onto the dome above and indeed onto the walls on the inside of the tower.

Internal structural design

Below is a drawing of the proposed internal structure of the tower, with a dome over the top, and a viewing platform in the centre at the bottom, with powerful projectors beaming upwards (not necessarily from a central point), lighting up the sides all round and the dome itself with projections, either of the water droplet, or indeed of many other extraordinary artistic creations. You will also note a viewing tower and a lift detailed. More on those below.



Bear in mind that it is 135 metres high and the base is 88 metres in diameter, so there would be ample room for several entire buildings on the inside.

A visible and sustainable legacy for SSE in Yorkshire

One factor that both National and Local Government have been working so hard on in the West Riding district of Yorkshire over the last 40 years or so is an effort to turn what has always been a major industrial belt into a more vibrant artistic and cultural region. SSE prides itself on 'Being Responsible' and 'Doing the right thing' and it seems to me that this project fits absolutely perfectly into this perception and could become SSE's legacy: i.e. making a meaningful, lasting and energizing contribution to Yorkshire by serving a cause greater than that of the company itself.

Financing and Sustainability – making it work

In order to bring it to life, it needs to be a unique and vibrantly sustainable project that not only acts as a legacy, but also provides a very viable income for SSE and other potential investors. The towers sit on one of the busiest motorway junctions in Yorkshire and are remarkably easy to get to. They are also visible from miles away, so cannot escape being seen by those people passing. The sculpture would itself be the draw card, whilst the activities that the tower offered would be unique, becoming its sustaining and profitable future.

The highest and longest Helter Skelter in the world ??

Helter skelters are always an attraction if they offer a high level of adrenaline input. Up until now, the highest helter skelter in the world is in London at the Olympic Park, a mere 76 metres high and 180 metres long. If we launch one on the cooling tower, it would be 130 metres high, and between 600 and 800 metres long, with the finest view of any helter skelter in the world. It could perhaps have 3 different levels for different age groups or abilities. Other possibilities include an amazing roller coaster on the inside of the tower.

An added feature would be the fact that each person who went down could be generating power to sustain all the power requirements for all the facilities. In short, the whole project could become a self-sustaining entertainment centre, with a high viewing platform looking over what must be a truly spectacular view of Yorkshire and an accompanying floating restaurant, and then at ground level, space for other franchises such as McDonalds, TGI Friday etc etc. Its location, at the junction of two major motorways means it would be visible to tens of thousands each week and would partially market itself. The proximity of Leeds, Bradford, Wakefield and Doncaster make this a brilliant location.

At ground level inside, there could be any number of uses, given the space available. The diameter of the bottom is 88 metres, so it could house a central viewing platform (to look up at the light displays) with accompanying headsets, a heritage centre (speaking of the history of coal, power and the local community) an experimental centre (aimed at children) offering a small cinema and a space in which to have fun with aspects of the future of energy and technology, a small café, a play area for small kids, a heated swimming pool, climbing facilities both inside and outside (depending on the level of difficulty required) and more. These can all be decided upon later, but this serves as a starting proposal.

Potential income strands based on current UK models

The Olympic Park slide was named the 'No.1 thing to do' in London in 2016. Tickets to visit the ArcelorMittal Orbit Sculpture and to ride the slide are priced from £10 to £17.50. We do not know the exact visitor numbers but it has been reported in the press at 150,000 a year (Guardian). This equates to entry revenues of about £1.5-

2.6mln a year before any additional concession revenue. The ArcelorMittal Sculpture is also available to hire for functions etc.

With the population of Yorkshire being about 5.3mln (2011 Census) and the wider region of North West, North East and Yorkshire having a population of nearly 15mln, there is a very large number of potential customers within a short distance of the Ferrybridge Tower. The Ferrybridge Tower would likely be even more popular than the London Orbit Tower as the size and scope of the project would be greater.

At this stage it is difficult to assess costs and pricing but the London slide is precedent for a similar successful project. The Ferrybridge Tower is in an excellent location with good access and potential footfall, making it likely that this project (just the sculpture and a helter skelter) would be similarly successful.

We do not have up to date visitor numbers for other major attractions, but there is some information available via the internet for other chargeable venues:
Tower of London – 2 million visitors
Chester Zoo - 1.3 million visitors
Eden Project – 1 million visitors

The potential for the Ferrybridge Tower project to be a major attraction is there as the size of the cooling Tower would allow multiple thrill rides. There is also the opportunity for a fantastic climbing wall and abseiling experience. The average spend across all of Merlin Entertainments attractions was £20 per person (2015). If we apply that average spend to Ferrybridge together with possible visitor numbers conservatively estimated of 500,000 then that would generate annual revenues of about £10 million.

The ArcelorMittal Orbit is a 114.5-metre-high sculpture and observation tower in the Queen Elizabeth Olympic Park in Stratford, London.

Construction of the sculpture itself

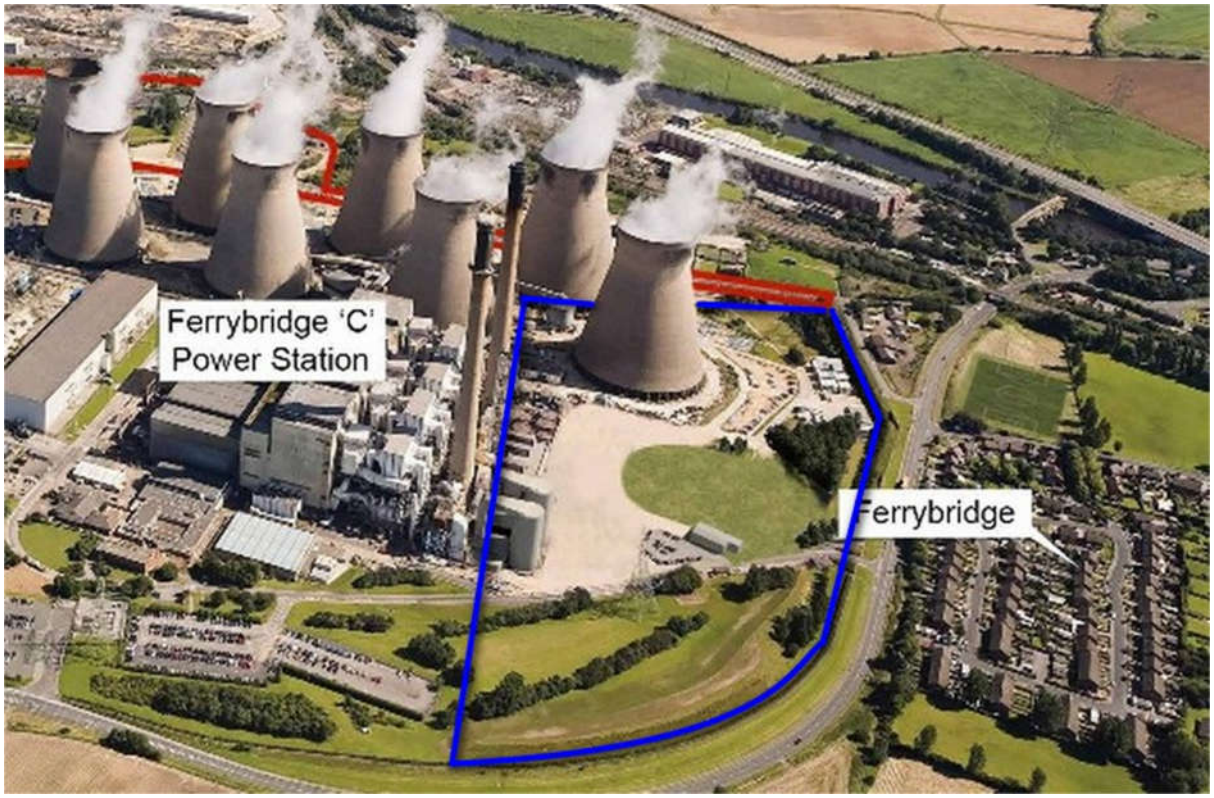
The dome covering the top of the tower would most likely be made in glass/perspex/aluminium and a steel structure. The 'waves' of light down the sides of the tower would be a lighter, more opaque material, and 'hung' on steel cladding. Because of the weather, wind etc, it would have to be designed so that the wind could not get underneath it, so that it isn't ripped off the side every time there is a storm. The helter skelter could run against the wall, underneath the cladding, popping in and out as it went around the tower.

The Visual effect

During the day, the 'waves', in an opaque medium, would be striking in the natural light and make the tower stand out (see earlier images in this paper). At night, it would come alive with light. This will be conducted by a series of projectors around the towers that project the light onto the tower, creating an extraordinary light show, highly visible to many. It would also mean that a variation of light shows could be projected from time to time against the sides of the tower and of course, inside the tower itself.

The proposed tower and additional space

In the image below, in blue, I have demarcated the proposed tower and the space around it that I propose would be ideal for this project. There needs to be enough space available as both car parking space and for the other franchises and activities that will, almost certainly, wish to participate.



The structure of the towers themselves

One of the issues that might be raised is that the proposed tower will not be strong enough to hold the sculpture cladding and indeed the helter skelter and viewing platform etc. I attach therefore, at the end of this document, the responses I have had from structural engineers at Leeds University. Nevertheless, there are five factors that we need to take into consideration;

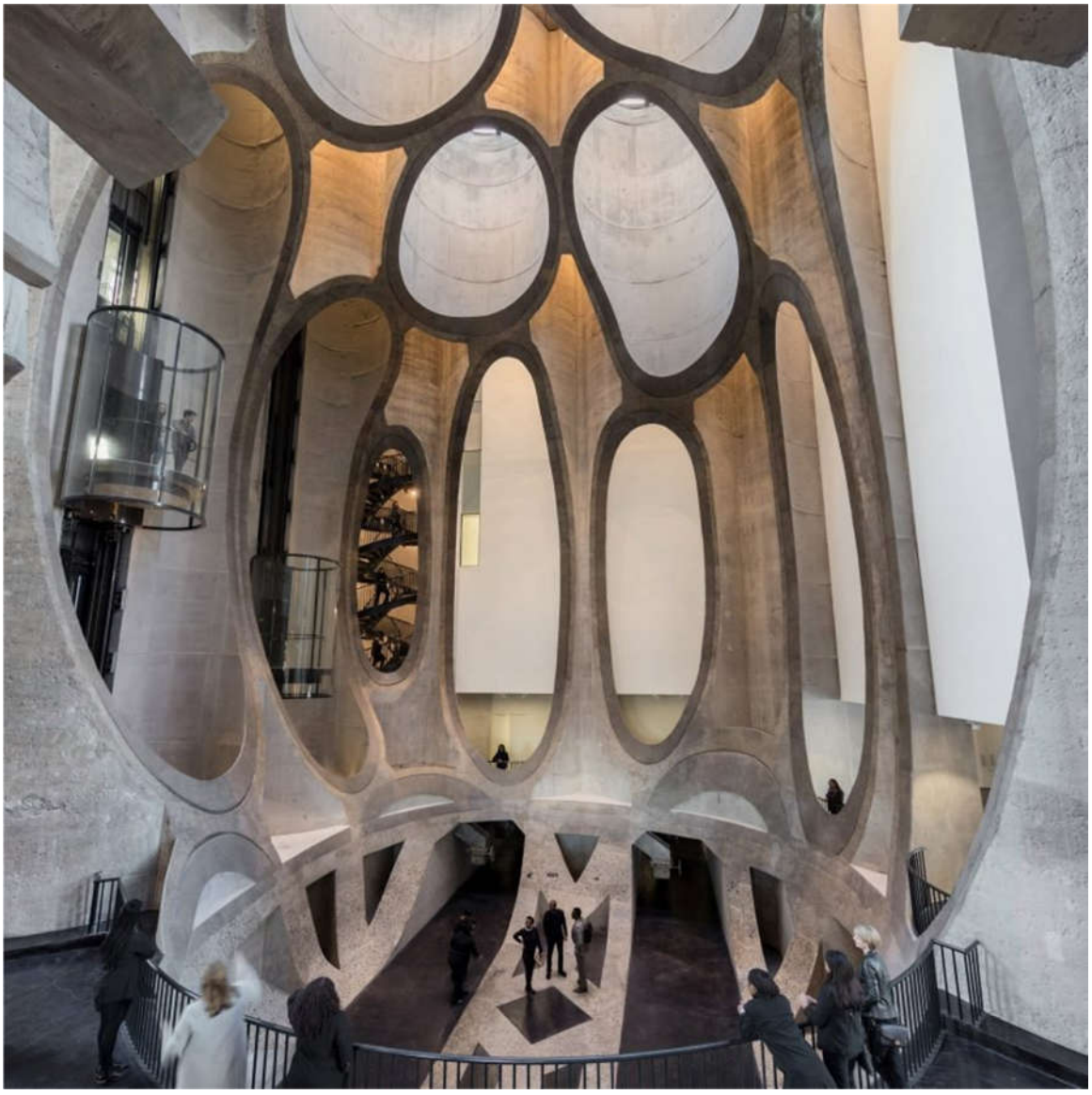
a) How sturdy are these towers, and could they withstand (and hold) all the additional weight? Would we need to add some vertical/frame structures to give the static stiffness we would need?
b) Has the cement become damaged, over the last 50 years of constant steam and (possibly) chemical sediment in a way that makes them unstable? (They seem to be holding out pretty well at the moment).
c) Is the site contaminated? (if plans are in motion to turn it into a business centre, it would suggest that it is not).
d) With only one tower standing by itself, would the aerodynamics adjust so dramatically as to make it unstable?
e) Would the sculptural design cause excessive wind noise?

The answers to these five important questions we don't yet really know. We also won't know them until we can engage with SSE's own maintenance and engineering section.

This is accepting, of course, that any work done on the towers would be very carefully considered anyway, and any maintenance that needed to be completed, provided it was within reason, would be made.

Another similar successful idea. MOCAA in Cape Town

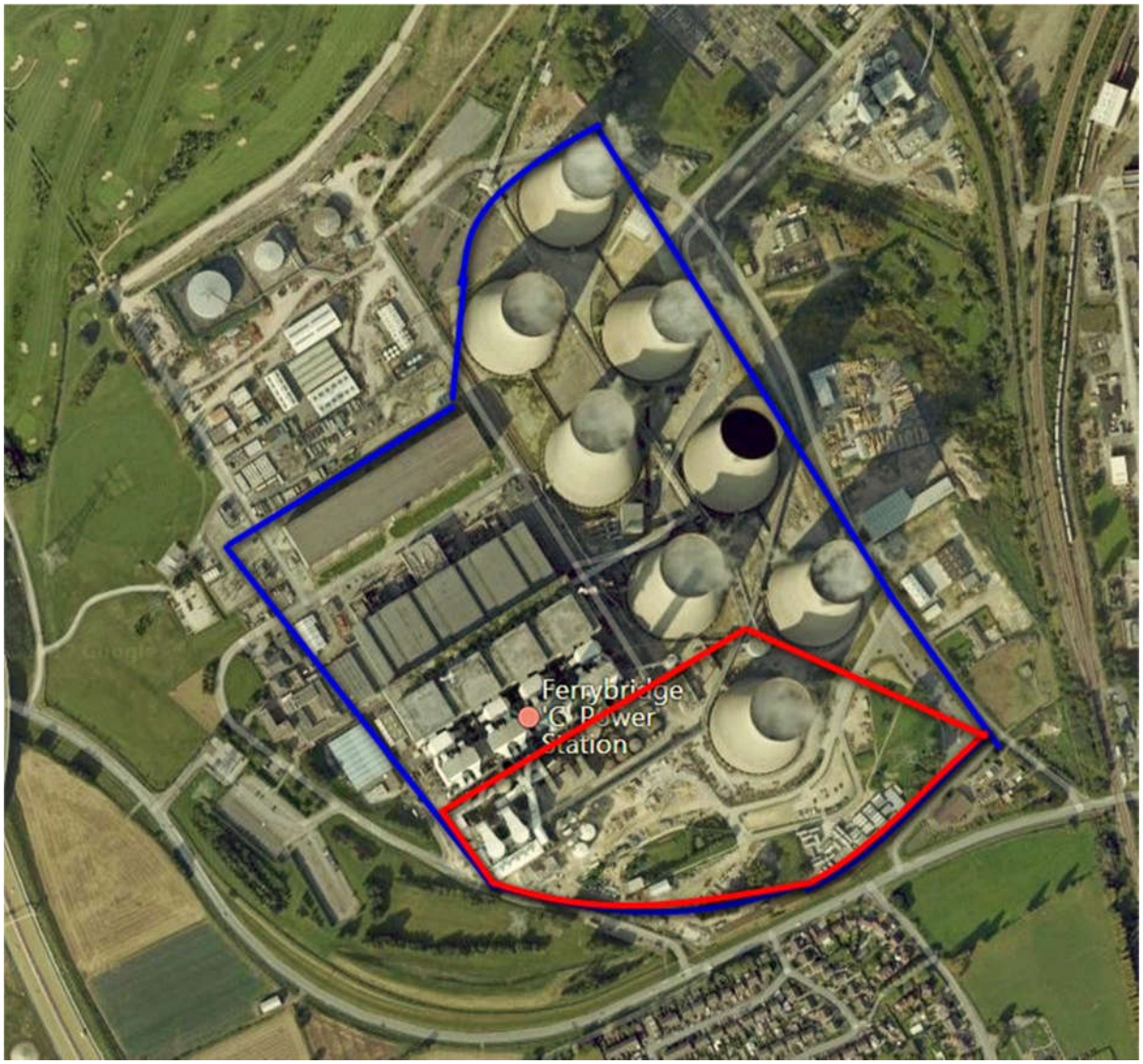
I have recently discovered a newly launched multi set-up in Cape Town - a set of grain storage towers that have been turned into a gallery, a hotel and a conference centre. Unlike the towers at Ferrybridge, it is only one building – see image below, which has been re-designed by Thomas Heatherwick from London. It is very clever and very beautiful.



A business centre - and co-existence

I have heard on the grapevine (without any confirmation) that SSE is considering the development of a large business park as an alternative to the Ferrybridge C power station and towers. This is a laudable idea, and I personally believe that a new business centre would coexist extremely well alongside the Tower Entertainment Centre. Looking at the image below, I have made a reasonable guess (in blue) as to which parts of the current structure are currently planned for demolition, and I add in, red, the space I propose for the Tower sculpture and entertainment centre. With

an educated guess, we believe the cost of the development of the Sculpture and Entertainment centre would be in the region of £10 million.



Proposal to SSE

I would like to propose to the SSE board that this would be an extraordinary Legacy: a new way of engaging with the public, gaining much publicity and good press in the process. This would show an extraordinary commitment to the community in which Ferrybridge plays such a large part.

We would like to propose the following;

a) That SSE do an initial safety and structural check on the Tower to see whether the project is possible.
b) That James Maberly and his partners form a new company called Ferrybridge Tower Entertainments which would manage the project.
c) For SSE to enter into exclusive discussions with Ferrybridge Tower Entertainments about the scope and nature of the project.

These steps would then allow for clearer decisions to be made on whether and how such a project can proceed.

Potential developers and investors

A number of large organisations involved in the entertainment business are already seeking to expand their operations, and this would be an ideal project for them to consider. If SSE wishes to take the lead in such a proposal, then we could work together on this.

Local Concerns – new employment

I am very aware that there is a lot of sadness surrounding the demise of Ferrybridge C locally. Such a project is likely to be very much to their liking and in their interests, as it would create a number of new jobs for those former power station employees.

Wakefield Council

I held discussions with Wakefield Council to see what their attitude might be to such a proposal and they have assured me that they would be delighted to see such a project underway as it adds yet another exciting and vibrant idea that helps to break up the rather stale and unexciting industrial belt that they are trying so hard to change.

Conclusion

I hope that you will have found this of interest and that you can see what an extraordinary opportunity this is, and what a benefit it would be to the local community. I am currently awaiting a 3D video version of this proposal which will show (roughly speaking) what this will look like once completed.

My phone number is 07885 976538. I would be very pleased to discuss this with you before proceeding to the next step, i.e. a meeting with the board in order to present my case.

James Maberly

James Maberly Sculpture

www.maberlyart.com

Below, please find more images, and a photoshopped image of what it might look like.

Here is another image of the towers from the southern A1M. I present the three images together so you can see that there is no abstraction in the size of the single tower

James Maberly
Red House Farm Studio
Dennington
Woodbridge
Suffolk. IP13 8AQ

Below is an email received from **Leeds University Engineering Department.**

From: Duncan Borman [mailto:d.j.borman@leeds.ac.uk]
Sent: 15 September 2017 12:00
To: jambomabs@gmail.com
Subject: FW: Ferry bridge Cooling towers - a proposal?

Dear James,

This sounds a worthwhile and fairly exciting prospect, but also that one of fairly significant challenge.

I have mentioned your e-mail to a couple of colleagues who are more directly involved with working with large and concrete structures than I am. One reply below.

It is possible for this could form a final year student research project, where they could do some additional investigation, but this may be a bit longer term than you need.

My other colleague who may have some ideas on this is currently away, but if he has some further ideas I can pass them on.

Kind regards

Duncan

Dr Duncan Borman
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Faculty of Engineering Digital and Blended Learning Champion
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Faculty Blended Learning Wiki

From: Nikolaos Nikitas
Sent: 15 September 2017 10:39
To: Duncan Borman <d.j.borman@leeds.ac.uk>; David Richardson <D.Richardson@leeds.ac.uk>;
Subject: RE: Ferry bridge Cooling towers - a proposal?

Hello all,

The problem is quite interesting though I am afraid it needs some good effort to be tackled adequately.

To me vertical load static stability is not the big issue; adding some vertical/frame structures that will do the elevation to the top level of the tower can help a lot and give you the static stiffness you are after.

Still for these kind of heights aerodynamics will dominate the response.

Particularly for these towers I checked the history of the 3 1965 collapses and no wonder it was connected to wind gales. This is actually the demarcation of a dynamic problem (rather than a static pressure force issue due to the wind).

Actually the phenomenon was also connected to wake effects (8 neighbouring towers) and included no pure vibrations as such (e.g. galloping, vortex shedding, buffeting). So very interesting problem but the study should start from previous aerodynamic/aeroelastic tests that were conducted for the quoted towers and the new tests that are to be conducted for the proposed shape modification. Note that the influence of weight on the natural frequency will play a big role on the aeroelastics too (and to me there would lie the biggest influence of weight).

So there is no definitive answer for any of the questions posed, but from my perspective there is a definitive starting point.

Hope this helps

Nick

Nikolaos Nikitas