Rab Bennetts: density and sustainability in cities

Rab Bennetts with his wife Denise, founded Bennetts Associates, a British firm of architects, in 1987. The firm has worked on the design of large buildings of all types with sustainable design as one of its key principles. With offices in London, Edinburgh and Manchester, to date the practice has accrued almost 200 awards, including shortlisting for the RIBA Stirling Prize three times and UK Architect of the Year on four occasions.

Since the early 1990s, Rab has pioneered the link between sustainable design and high-quality architecture, and is a founder of the UK Green Building Council. He additionally advises on architectural procurement, design competitions and construction industry research projects.

Rab chairs Sadler's Wells Foundation and, in 2003, was awarded the OBE for services to architecture. He has a lot to share with us on the importance of sustainability and the meaning High Density in 21st century cities

Bristol high rise forum, 5th March 2020

Rab Bennetts, Bennetts Associates

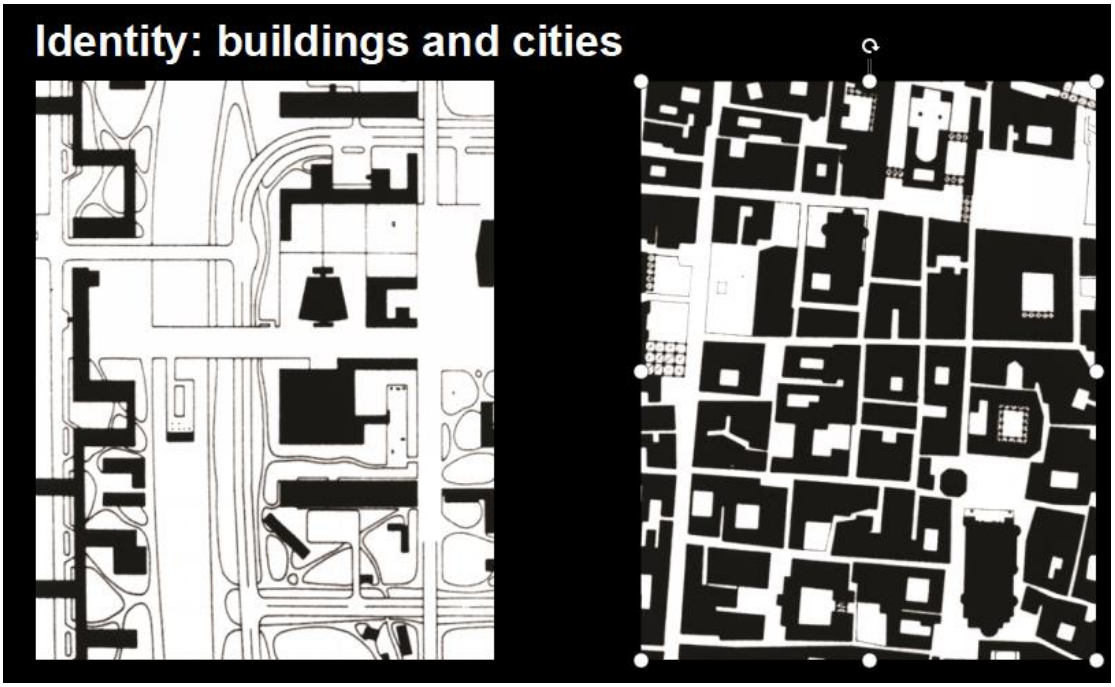
Globalisation, tall buildings, and cities

I thought I would talk a bit about density of buildings in cities, because that is at the heart of the issue, as well as sustainability and then show some examples of work we're been looking at in Edinburgh and London.

The following are two pages of a book that I came across in 1978, just after I had left architecture school. These two pages could not more dramatically illustrate the difference between the kind of city I like, which

is the one on the right, and the city on the left which has basically generated most forms of modern cities since about the 1930s, certainly in the post war period.

And of course it is a Corbusian town plan.



Where the penny dropped for me was not just the nature of the spaces around the buildings - but that the buildings themselves were individual artefacts in space. You could admire them, you could go around them and see their individual forms.

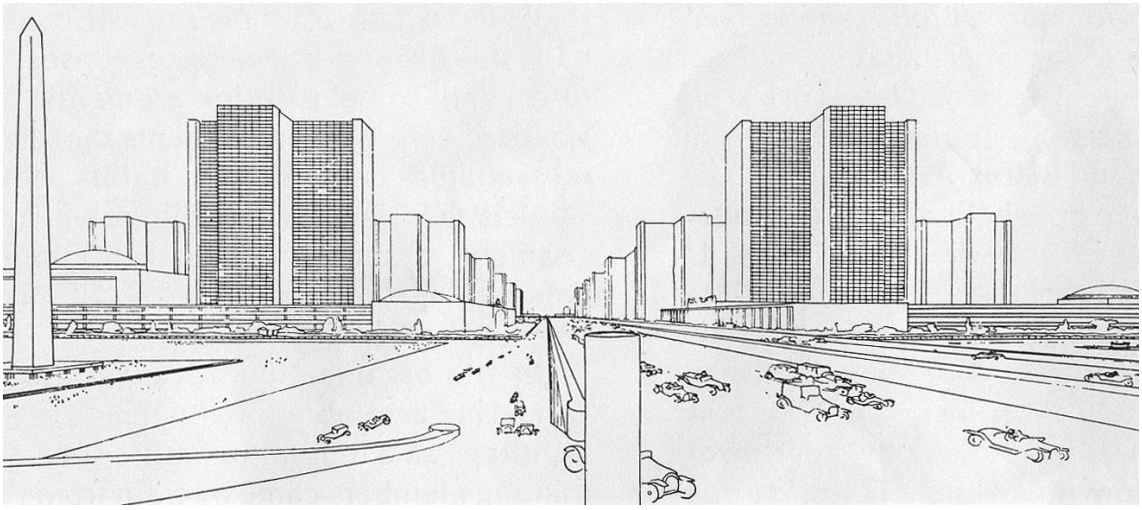
Whereas the drawing on the right had buildings which were the backdrop for a city. It happens to be Parma in Northern Italy, but it could be a lot of European cities. That's very much about context: European streets, squares and so on.

So I was inclined to think that one of the problems architects have had with the Corbusian city is this fixation with going tall. An important link was established, at that time, between height and a building standing in glorious isolation, on its own, like an artefact, like an object of art.

It was about the same time that architects were no longer seen as master-builder craftsmen, but tended to be seen as fine artists. There was a very important transition about what the role of the architect should be.

The city on the right [above] nevertheless had lots of opportunities for individuality. And some of the major buildings could just as easily be modern as they could be historical buildings.

And the one on the left? It is interesting that Corbusier made all these buildings the same, they are symmetrical but I don't think, pace Create Streets, that you would say it is the nicest symmetry.



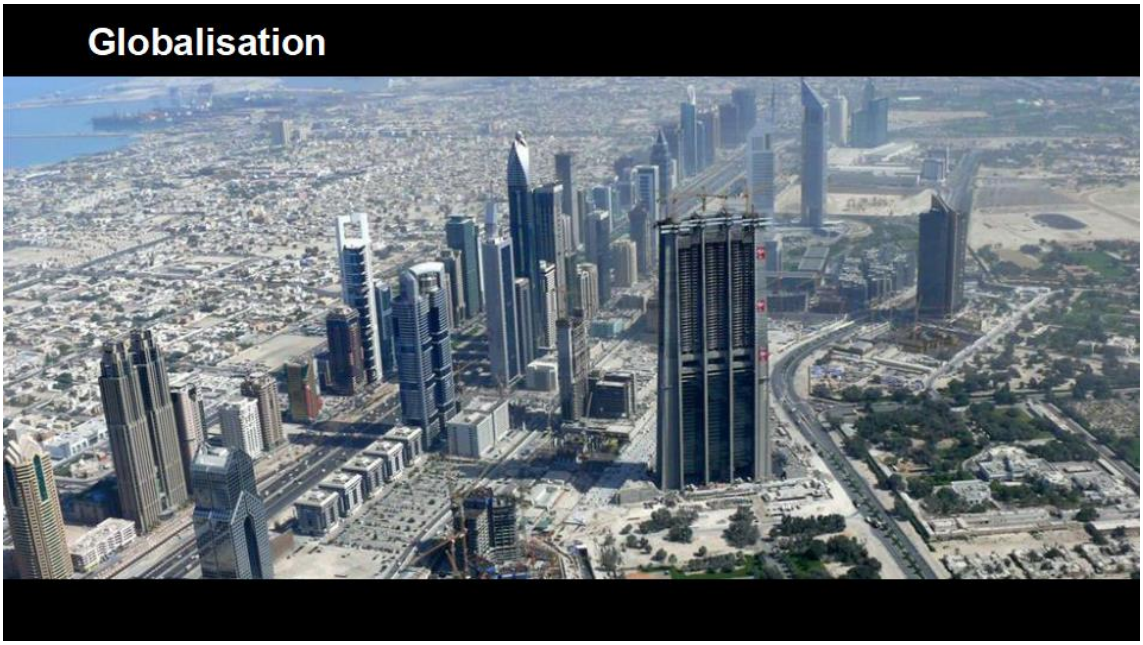
And of course it was largely discredited quite quickly because of the nature of the urban space around it. If you look at what happened in Britain, quite typically this is what happened:

This is in Glasgow by the way. But in Edinburgh where I grew up there were tower blocks like this on the perimeter, and the spaces between were absolutely horrific. There is good design and there is bad design, it is not something about modern or classical or historicist, it is about quality.

Of course most of these buildings have now gone, they didn't work. Social housing at this scale, way off the ground like that for families, really didn't

work. Taller buildings nowadays in the residential sector are nearly all private. They will have a concierge, they will be there for investment reasons or private rental. It is a very different type of phenomenon.

Yet modern planning of the type that I showed in the Corbusian slide has spread all over the world, because modern life is like that. So it ends up as a kind of globalisation. A slide like this, I think that is Abu Dhabi, but it might just as well be Dubai! Cities are losing their distinctiveness.



Meanwhile individualism has taken off in terms of the design of tall buildings. And it occurred to me that places like this don't really have a character to start with, so they are trying to draw attention to themselves by virtue of a cluster of tall buildings making an impact.

The American cities are rather the same. It is in the DNA of American cities that these buildings go tall. You approach somewhere like Chicago from a distance and it is rather thrilling, it doesn't seem inappropriate that the buildings are tall.

Whereas here, because there wasn't anything there before, and the buildings are isolated, there isn't really a sense of community at street level.

The next one, much more recent, is Beijing. This idea of the big building as an artefact sitting in glorious space, you can see how it has taken off.

In the foreground is the CCTV building - the Chinese television service - by OMA, and like the ones behind, the degree to which they are showing off

is not so much a sign of confidence in the future, but a sign of insecurity, I would argue.

The idea is that we have to have energetic tall buildings to put ourselves on the world map. I say: well hang on a minute, there are plenty of cities like London or Edinburgh, which I know best, which are easily confident enough to hold their own on the world stage. You don't need tall buildings to make that point. Other cities might, but not necessarily the ones that I know.

So I look at that [below] and I shudder slightly. It is actually quite close to home. If you take the building on the left, that is in Luxembourg, by the architect Dominique Perrault. I think you can just see that there is a tiny little guy down there walking between the buildings. It just is the most dystopian environment when you do things like that to a city - when you don't make the spaces between buildings as good as they should be.

The one on the right of course you will recognise as London, a very recent shot from a couple of weeks ago.

This tallest building has just been topped out, it is being occupied fairly soon, and it has absolutely shattered the scale of London. But the cluster in the middle isn't really where the problem lies, it is things like this on the right, where you have this attention-seeking weird sculptural shape standing apart from the cluster, and the City Corporation and the planners are trying to think "how can we make sense of this strange building, which should never have happened?" They are trying to fill in the space between them with new tower consents which will work with the original cluster plan.

Basing oneself on localised 'placemaking'

I thought I would give you, in contrast, an example of buildings really based on locality - not on this international style or globalised building which appears everywhere throughout the globe, regardless of climate and culture and all the rest of it.

It happens to be King's Cross - the gigantic development around the King's Cross and St Pancras stations. It is the largest in Europe. There is one tall building at the north of the site which is a kind of compositional thing. I really think it is OK, 20 storeys of student housing (it turns out), and it terminates the development.

Nearly all the buildings are low to middle rise. The ones here [at one end] are about 10-12 storeys. The ones in the middle are less. There is one old building from the railway days, and another railway building.

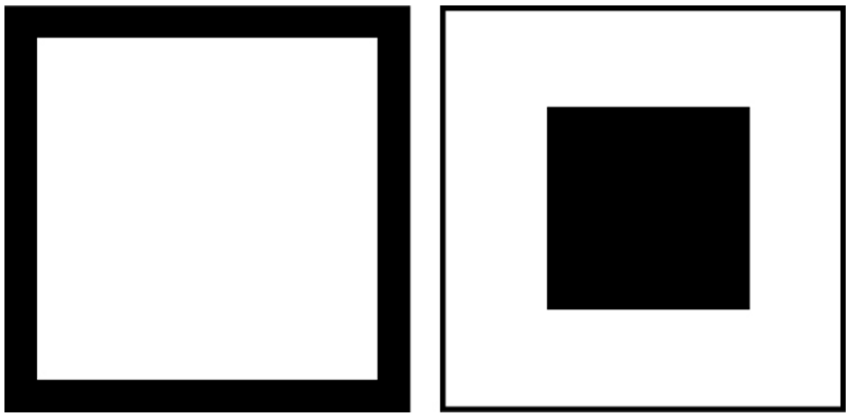
So the plan was improvised around existing buildings, and the quirks and the shapes of the plots that you get are a result of that.

People don't remember the buildings - I can say that with confidence because we designed four buildings on that site - they remember the streets and the squares and the avenues and the bridges across the canal, which runs through the middle.

There are quite a lot of similarities with bits of Bristol, as it turns out, but it is all done at very high density, moderate rise (medium as well as low), and enormously successful commercially. Every building was pre-let before it was finished. We have Google and Facebook but lots of smaller tenants too, and it is now starting to move across the rail tracks to where St Pancras hospital is going to be redeveloped.

So [this kind of] low-rise based on place seems to be a much better way of achieving density and identity than high rise, which could be anywhere in the world.

Sustainability: efficiency, climate and resources



Philip already mentioned the diagrams from the 1960s and 70s, I am very fond of them. This one is a mathematical diagrammatic comparison between a perimeter block, versus a block in the centre of a plot, all other things being equal.

You can see that the nature of the space is very different.

One of them encloses space, which could be communal, and the other has space which will join onto surrounding developments in the dead way that those earlier diagrams showed.

If you look at this in a bit more detail in practical examples, [on the left below] this is London, the Bedford Estate, very high density. It is very versatile, because the buildings have regular floors which do connect if you knock a hole through the party wall (which Historic England don't like very much, but you can). There are houses, there are offices, there are little schools, and various other activities in these units of space. Some have been converted back to houses, when offices moved out.

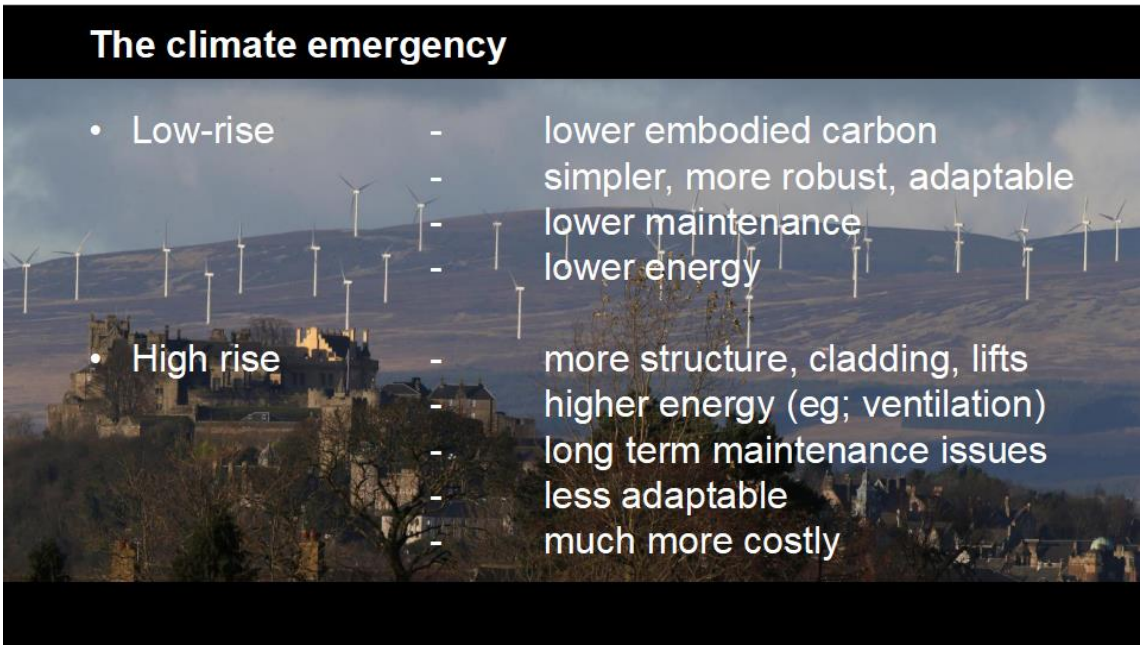
So sustainability is a lot to do with longer uses. What happens after 200 years? Can it be adapted to other things, so you don't have to flatten it and build something new?

The one on the right is Edinburgh. It is a phenomenal development from the 1870s and just into the 1900s called Marchmont. It is five stories or four stories with a basement, which is the highest that you can do with a walk up. Nowadays it might have lifts. It means that all those flats on the ground floor have a garden at the front, all the ones above - the other three - have a share of the communal garden in the rear, with mature trees - they are very nice spaces and highly prized. Again they are versatile, some of them are in private ownership, some are rented, and so on. But it is very dense.

So you wouldn't dream of doing taller buildings in a space like that with bigger spaces in between. It has enough density so that the shops work. There are no pound shops and empty shops boarded up, or they are very few and far between. There are proper shops, little supermarkets and pubs and things that actually work.

We often find planners ask us to make active frontages, and there isn't enough activity, because there's not enough density. But the density of these developments can make the streets work really well.

Tall buildings = high energy use. Day-to-day AND embodied.
To make comparisons between low rise and high rise, I thought I would put this slide up.



Some of the points have been covered already, but the backdrop of a wind farm in Scotland is quite a nice thing.

Low-rise buildings have lower embodied carbon, I will explain a bit more about that in a minute.

Low-rise buildings are simpler. They are robust. They can be adapted to other things, they have lower maintenance, they can be made of simple things like brick cavity walls. You put that up 25 storeys, it doesn't really work. And they are definitely much lower energy. You can do things in a low rise, like open a window, which you can't do in a high rise.

Tall buildings have more structure, cladding and lifts. And the calculation that Philip shared of about 60% greater embodied carbon is about right, we have done the same calculation. If it is done on a square metre basis you wouldn't get a true answer, because if you want a 100,000 square feet office to use as rented space with 40 storeys, you have to build an enormous core. So a square metre rate doesn't properly represent it, you should use the gross area of the building divided by the cost of energy. And it is about 64% efficient if it is high rise, as opposed to nearly 80% efficient if it is low rise. So the amount of waste in tall construction is huge.

The tall building has higher energy use, for the reasons we have heard. You can't just open the windows. And the difference between a mechanically ventilated office and a naturally ventilated office is very substantial, it triggers all kinds of other things like the amount of mechanical plant, the embodied energy that goes into making the plant outweighs what it is using when it is in use.

Now one building that I have done near here which is maybe known to some of you is the Wessex headquarters in Bath, which was a very low-level energy building from about 20 years ago.

We went back to see it in December, just to see how it was performing. And we found that the levels of energy consumption of a well looked-after building were coming down to about a third of the averages that Philip was showing. It was way down the list - towards zero carbon.

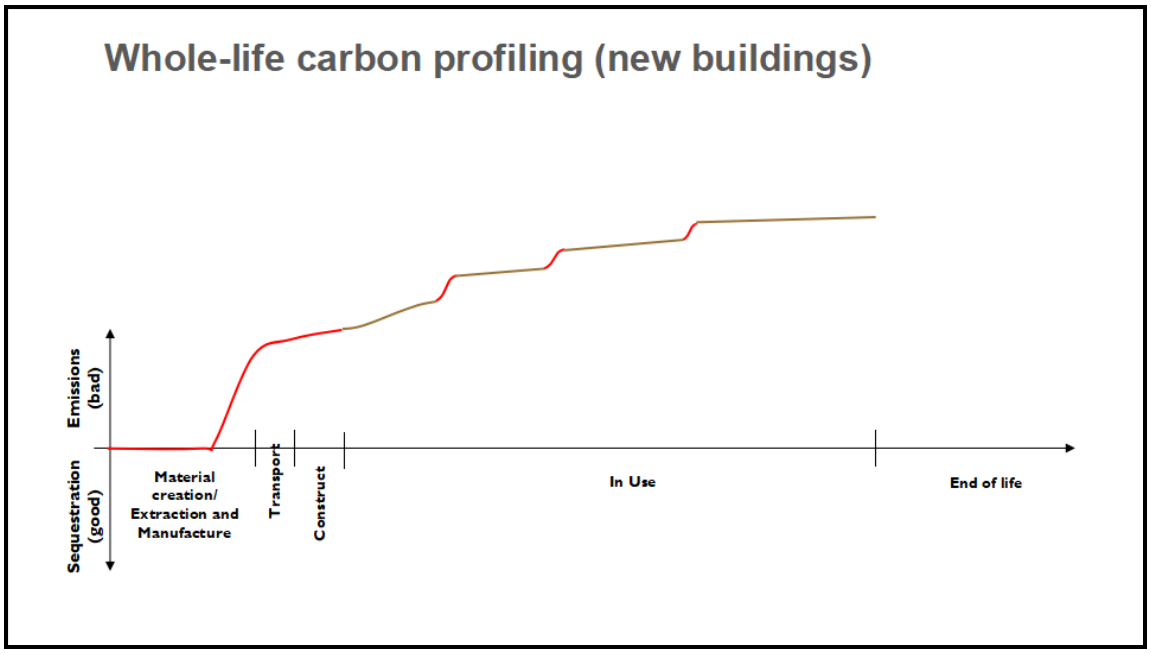
If you were to switch its fuel source, which is gas, to renewable electricity, it would officially come in at what is called zero carbon, there are certain metrics that you comply with. So there *are* ways of doing it.

It is a naturally ventilated building. It is very simple, you open the windows, you have shading over the glass. People seem to like it, they stay in their jobs for a long time. So it has got economic benefits as well.

The other problem with the high rise is long-term maintenance: imagine re-cladding a 40-storey block in 25 years, when your lease arrangements aren't quite in synch with that. Also you can never use it for anything else. If it is flats, or if it is offices.

And of course it is much more costly. I did a calculation at the weekend, because there was an article about high rise costs in Building Magazine, and it is about 60% more expensive to build a high rise office than a medium-to-low rise office. Which is not surprising because the costs in it are enormous, and it is not where you would go, if you were trying to stick to sustainability. Now I will now show you a bit more about the detail of that

Whole-life carbon profiling



This is what is known as a whole life carbon profile of a typical office building. Along the bottom is about 60 years, or thereabouts.

You can see that the line climbs quite quickly using red, - this is the construction phase - then it goes flat to a darker colour showing operational carbon , then it jumps up with a refurbishment, goes flat, jumps up for another refurbishment, then flat and so on.

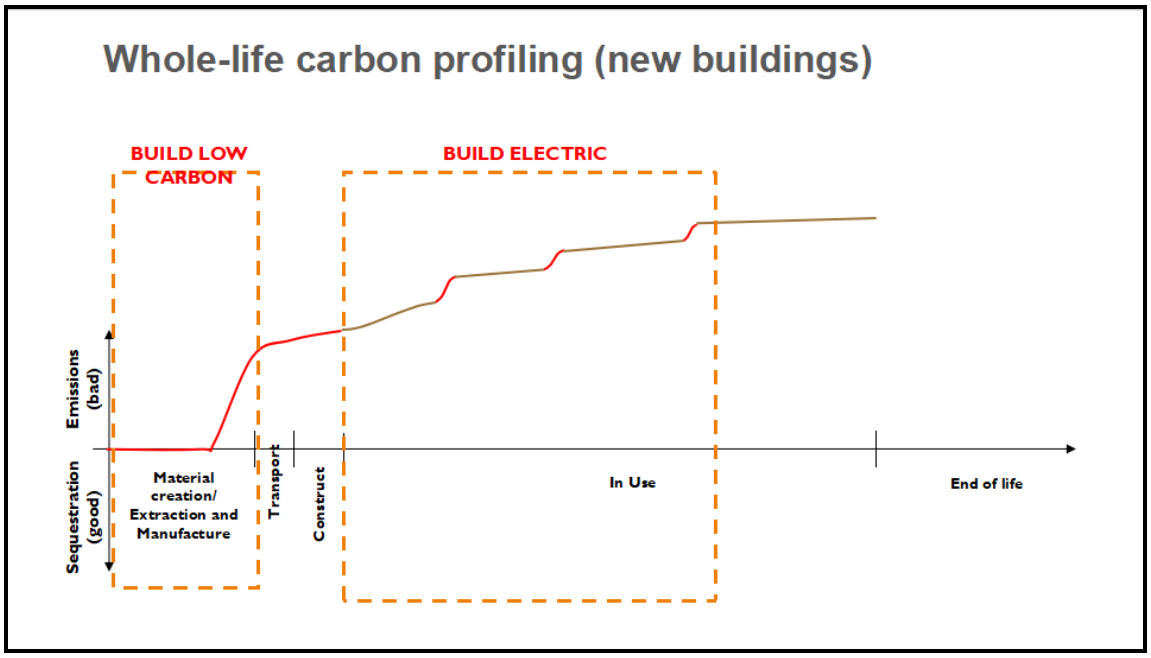
We are now using better materials than we were, but there is no arguing about it, the carbon used in construction outweighs the amount of carbon used in a 60-year life, which is quite shocking. For many years we didn't think that was the case but recent evidence is quite clear.

So you have a great leap up in your impact on the planet before you even start occupying the building. Then you have a relatively shallow slope - that is the energy being used - then you refurbish the building after several years, then another slope for another 15 years, than after a few years you refurbish things like carpets and ceilings, then another gentle

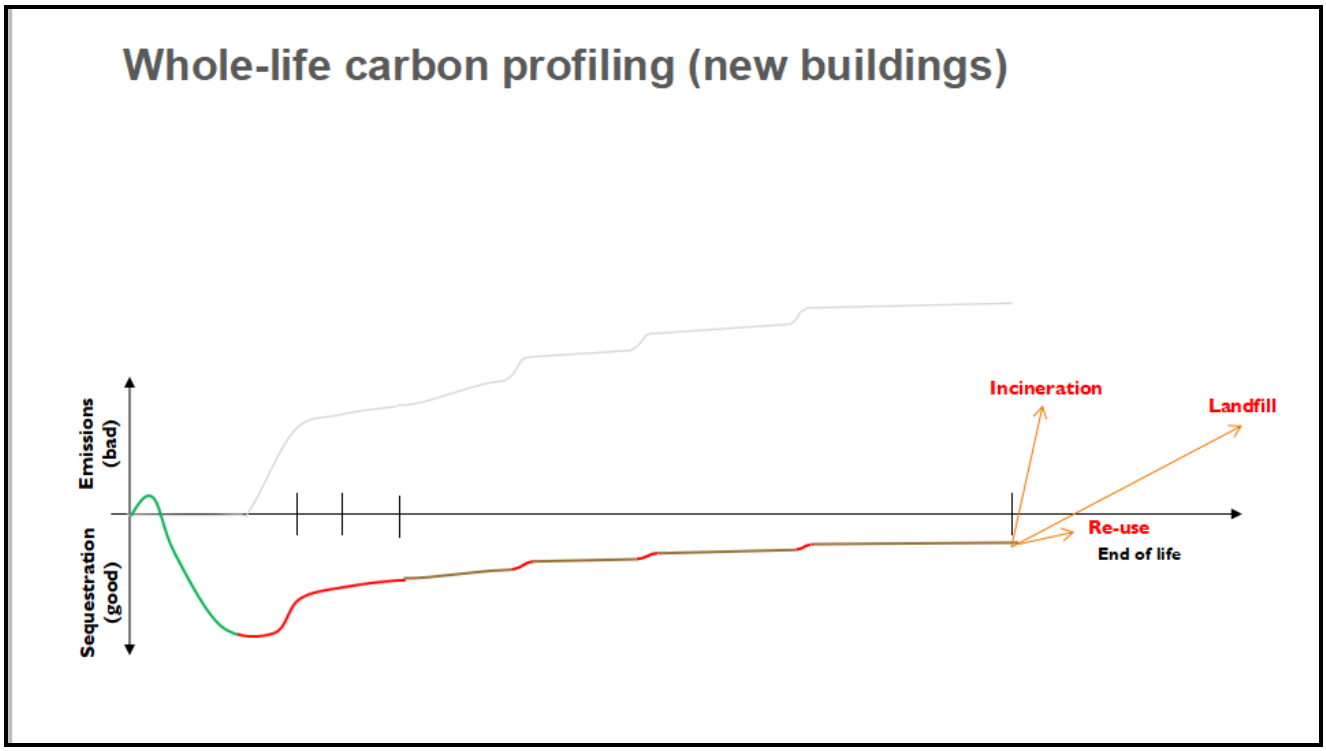
slope, and eventually as energy becomes more efficient the line tails off to almost horizontal.

What we should be trying to do is to build by the lowest embodied carbon method possible. Which could be an existing building (if there was one), and you would use renewable energy from electricity. Scotland was self-sufficient on renewable for five days last year, and the previous year about the same, and it is obviously increasing as time goes on, so it isn't beyond the realms of imagination to say that Scotland will be self-sufficient in renewable energy within a period of time - 2045 they are trying to make carbon zero, I think they might do renewable energy before that.

The fact is, renewable energy is increasingly available in Scotland with wind and hydro, and in England you have more solar, because the climate is different.



What we should be trying to do is to get to zero carbon - removing that great peak of the graph at the beginning, either by using an existing building or using timber structures. You can sequestrate that and count the carbon that has been absorbed by the trees. Then you start that graph, slightly increasing every year as you use energy. Hopefully, by the time 60 years is up, you won't have come back to zero.



That is hugely optimistic and ambitious, but that is the scale of the problem we face if we are going to get zero carbon. Certainly Edinburgh is targetting zero carbon by 2030, they claim. London, I don't know how on earth it is going to happen by 2030; Bristol likewise, is that right?

Carbon zero will NOT happen by building high rises

A drastic change is going to have to happen to make zero carbon a reality. Switching that graph from above the line to below the line is not going to happen with high rise buildings. For sustainability, tall buildings is the last thing you want to do, you need to get down to a building type which is more conventional in its form. I don't mean more traditional architecture, it can be modern architecture. But I mean something which is more in a scale to make it easier in construction, easier to ventilate, and so on.

Edinburgh, which once created planning blight, is now building good, well-connected mid-rise suburbs.

Moving on, I thought I would show you what happened in Edinburgh, my home town. I have spent a lot of time up there. This [below] is obviously Princes Street looking from the Calton Hill with the castle on the left. Just on the right hand side is the edge of a building called the St James Centre, which has recently been partly demolished.

You can see it is a low-rise city, it has got spires, it has got domes, it has got bizarrely the Clock Tower hotel by the station, which came after an Act of Parliament to stop high buildings in 1829 on that site.

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In the 1960s when I was at school this building was built, the St James Centre, and it was mostly low - but pretty brutal (I didn't like it particularly) - but what really offended everyone was the high element, going way above the existing skyline, and it was extremely damaging to the skyline of Edinburgh from the North looking South towards the castle and the old town. So there was a terrible storm about that, people really didn't like it at all.

At the bottom of this area is Leith Street: which was lined with tenements, some of them with a upper level deck on them. Even that was

swept away for no good reason, and it took until about 10 years ago for this site to be filled in.

Of course it has all the signs of modern life, a dual carriageway even though there isn't really enough traffic, a pedestrian bridge going to a car park, John Lewis on the right is the bit that got retained while they built around it. There is a new building going in which is quite tall - I think people are still quite upset about it - but it is not as tall and not as lumpy as this one.

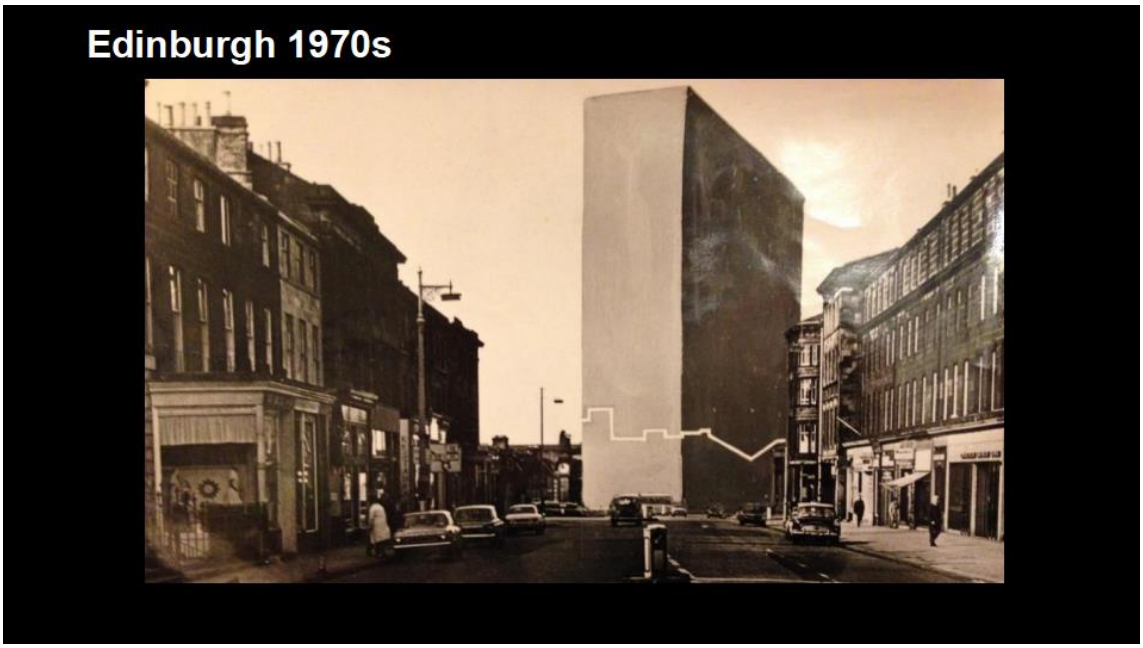
As a result, the campaign to save Edinburgh started in the '60s. There were a series of groups formed at the time: the New Town Conservation Group, the Cockburn Society, and all the rest. Some of these groups eventually morphed into the Edinburgh World Heritage Trust , and they are looking after the centre of town - but only the Unesco heritage site - not the rest of it.

Outside Edinburgh centre

Other things are happening elsewhere too. I'll show you some more of that.

This is a view looking from the other direction. Here is the Castle, and right at the bottom of the slide you see a blank site, undeveloped, at Haymarket Station.

Now when I was in second year at college, in the early 1970s, this was proposed on that site:



I think the opposition groups produced this to show how bad the building was, but of course it didn't do them any favours, it was criticised for being inaccurate, and unflattering and so on. So what they did instead was they erected a barrage balloon on a series of cables up to the same height as this building, and then said to people you can see it from all over Edinburgh, go and have a look - and you could.

If you were coming in from the West, you would get the Castle and St Mary's Cathedral and this balloon was up there in front. And so it stopped the development, basically. Opposition to higher buildings really dates from that time.

That was in the 70s. Now 40 years later we finally have planning consent for a building on this site. This is a building by Foster. It is the right sort of scale, you would say. I am not entirely sure all-glass is appropriate, but there we go, that is a choice. But it has taken nearly 40 years to get a derelict site to be developed because of the opposition that stopped the wrong kind of scheme happening at the time. That might be one of the lessons here - if people are so opposed to something happening in the city, it results in blight forever. Wouldn't it be better if the authorities just recognised it, and did the right thing in the first place?

Here's another one. This is the university in the 1960s. They had just built the Appleton Tower near George Square, and this site had been demolished. I remember as a kid going past it as it was being done.

Again, people turned out on the streets to stop developments going ahead next to George Square, because they had already demolished quite a lot of Georgian houses for this building and several others. And they were quite good buildings in their own way, but the loss was so great.

So what happened until 2003 is that it was left as a car park.

So there were 40 odd years of no building on the site, nothing useful being built on this site, except the car park. It could have been much more positive.

Then there was an architectural competition. To my absolute astonishment we won it, so we did a low rise building in a grouping like this. We got knocked back by two storeys off the tall bit, but we built it as you can see on the left.

It is a series of blocks looking over courtyards and alleyways and what you would call a pend up there, rather like the alleyways of old Edinburgh. The architectural form and style you can debate. But it is a low building, so people don't notice it that much until you experience it. That seems to be quite appropriate for a place like that.

In the 21st century this development nearby has gone up. This is the Old Royal Infirmary (another one of our jobs was refurbishing that). But the point of showing this is that the whole of the site has been taken on as master-plan for a mixed use office and residential development.

Foster's have master-planned it, they have done a pretty good job. You get older buildings interspersed with new buildings, and that combination is

really rather unique. The scale and the improvisation makes the place very distinctive. It could only be Edinburgh - I don't think you could see something quite like that elsewhere.

Incidentally, these old buildings are the Florence Nightingale wards of the old hospital. We are bringing back natural ventilation to the wards where the National Health Service put in air conditioning and flat ceilings everywhere.

On the outskirts of Edinburgh, down at Granton , and to the North and to the West of Edinburgh, lots of new development is going to happen now because the population is still climbing. In 10-15 years time it is said that the population of Edinburgh will overtake the declining population of Glasgow (when I was a kid it was a million for one and half a million for the other).

Most of that development can't happen in the centre. But it is all being done on a dense and low-rise basis, with streets based on footfall. The tram goes right through the middle, so it will take Edinburgh to 2030.

I am not a spokesperson for the council, I promise you. But they are trying to say: transport is everything here. We have to stop people bringing their cars in. Make it convenient to use bus and tram and then people will leave their cars at home and it will be pollution-free. And if it is electric it will help.

Of course the scale of buildings will be appropriate to the outer edges of town, where development can take place. I wouldn't mind a few taller buildings at the edges, I think that works OK in many cities, but not in the centre where it really would mess everything up, and that is what we are trying to protect, because it is a castle and surroundings like none other.

Edinburgh 2020

How the planning system makes good intentions go awry
To finish off on London, I thought I would show you this. This is 2005 - which I gather is roughly the same date as your tall buildings policy, of old.

We were commissioned to do a development at the South end of Islington quite near the junction to Hackney and the City. Just keep your eyes on this slide for one that is coming up later on. This is the City of London with the Gherkin, nearly the tallest building at the time with the old NatWest Tower and a few more towers. Then over here you have got St Paul's - you can just make out St Pauls and Guy's Hospital.

We were asked to see if we could get a large development on a canal-side site, which is very relevant to Bristol. We decided to try to pile it up at one end, so that the density alongside the canal could be lower.

So this is the scheme, and it has got lower buildings down the edges, because taller buildings would have been a canyon. We proposed a building at the end of 25 storeys. Quite sleek, quite simple, and it is quite close to Council flats of 18 and 22 storeys, so we thought 25 storeys was OK. And it has a good compositional sense at the end of a canal. It is right on the main road from the Angel to the City, so there is a big thoroughfare past it.

And then somebody else comes along and says well hang on, why don't we do 37 storeys? I thought there was quite a good reason for 25, but then he said, why not 37? And of course then you are struggling, because what is the case for 25? Is it not the same case for 37? And it is probably a fair point.

Now what happened in the long run is we got planning consent for this building. Then the developer sold the site to somebody else, and they came in with a completely different scheme which is called Canaletto! So the slides David showed earlier, that ghastly thing, that is what happened.

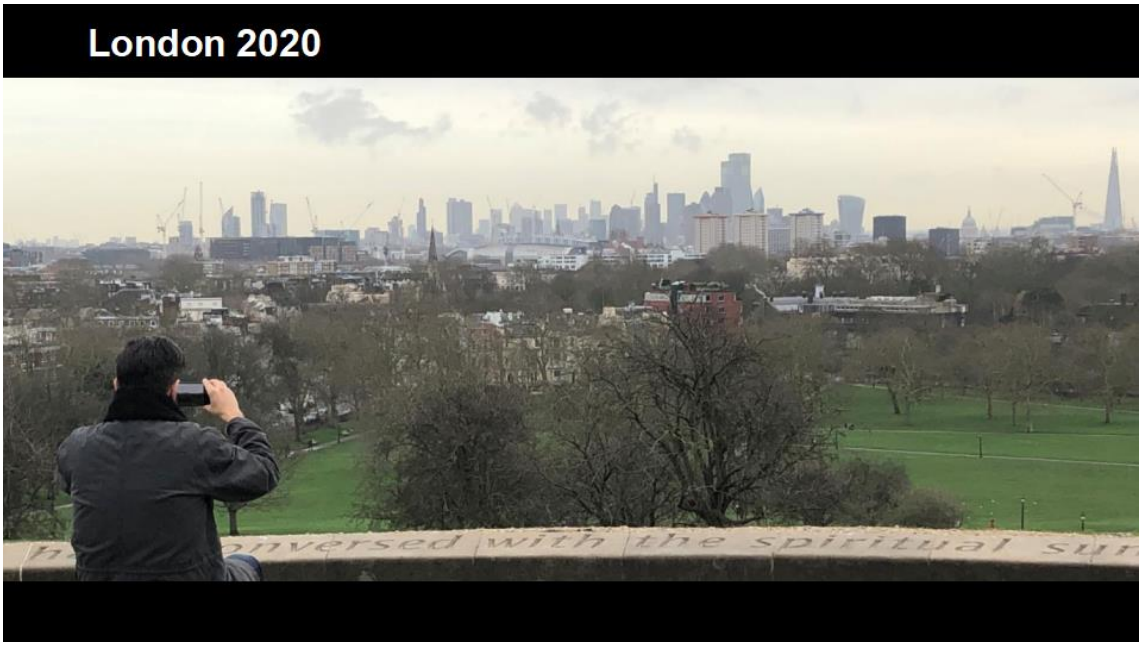
So that is what happens. Just because you think you are getting a consent for something beautiful, 25 storeys or not, doesn't mean that you are going to get it built like that.

And I will bet it is one of the half a million properties in the UK which is valueless right now because of its cladding. The story of cladding is not unique to tall buildings, but certainly with buildings over 18 metres there is a real problem there.

This is looking down City Road, with the 37 storeys and the 25 storeys, and the Foster development of 42 storeys on the other side where, as Philip said, a 7 storey block would have fitted in the same amount of accommodation. In the distance you have the blocks of Hackney, which was uncontrolled.

Islington used our scheme as the benchmark for only three places in Islington that could have tall buildings, and they held the line for 15 years: no buildings taller than 30 metres other than those 3 sites. They used it very effectively as a mechanism for stopping inappropriate tall buildings.

But of course now the floodgates are open and you have things like this happening all over the place. And if you remember that slide that I mentioned, keep your eye on the skyline, that is what it is like now.



And the little development that I was talking about is over here [to the left]. Then the other projects at the edge of Islington and Hackney. The gherkin you can't see any more. And then the NatWest Tower. The big one that I mentioned has changed the scale [in the centre]. There is the Walkie-Talkie, that funny-shaped piece of sculpture that everybody pretends is going to be filled in with other things. There is St Pauls and the Shard.

Now the Shard is a striking building. It was consented around 2005, in a deal done by Ken Livingstone as mayor with developers. Ken Livingstone in his time consented 19 tall buildings. His successor Boris Johnson, consented over 500. When he was elected he said: Don't worry, I won't create Dubai-on-Thames. So what he has done is created a Dubai-on-Thames. This could be anywhere. And it is almost directly opposite the Houses of Parliament.

And if you haven't been to London for a little while you will be astonished. As you look up and down in every direction, it is the riverside that has been covered with blocks, as much as anything else.

When Sadiq Khan was going for election I went to see him with a couple of other people and said, can we influence you on tall buildings policy? We would like to suggest that London should have a character assessment, a bit like a conservation area. All conservation areas have a character assessment. You pick out the major buildings and identify opportunities. Well, there is no such thing for London.

What are the characteristics of London? You would say, it is a low-lying river valley with a big meandering river which you can look into from the low hills some distance off. Which is why the skyline is so important. What you would not do is to line the river itself with tall buildings. But that is what happened.

So the emerging tall buildings policy which we were trying to get is about character assessment, long view analysis, planning briefs for the sites where it was acknowledged that tall buildings were a good idea - and there are some - and design reviews for every important site. Because if you get tall buildings wrong you are in trouble. Also low rise alternatives, to see what could happen if it wasn't a tall building. Most of all, quality standards (and this is something planning authorities find really difficult to control) so you don't get poor quality buildings which will deteriorate over time.

Now I was doing this slide - and I decided that before I show it, I had better Google Bristol tall buildings policy, and it came up with the 2005 policy, and I rather liked that. I gather it is now perhaps not being used as much as it should be.

So I thought I would just finish there and talk about hot air once again.