HYPERLOCALIZATION
OF
ARCHITECTURE

CONTEMPORARY SUSTAINABLE ARCHETYPES

ANDREW MICHLER
[OURS] HYPERLOCALIZATION OF ARCHITECTURE
LLOYD.Alter

The Guggenheim Museum in Bilbao is a wonderful pile. It revolutionized how we think of the role of buildings in our cities; it was the original demonstration of what is now known as the “Bilbao effect” where a building is powerful enough that it revitalizes a whole community. However, if you hold a photo of it up beside a photo of the Walt Disney concert hall in Los Angeles, I challenge you to tell which one is which. They are both alien, dropped into a milieu where they stand out like sore thumbs, as they were meant to. The same can be said for many of the so-called “starchitects”- designed buildings from Rem to Zaha. The same is true for your typical glass office building or subdivision house; they could be anywhere. They are devoid of place. But place matters.

Christopher Alexander wrote: This is a fundamental view of the world. It says that when you build a thing you cannot merely build that thing in isolation, but must repeat the world around it, and within it, so that the larger world at that one place becomes more coherent, and more whole; and the thing which you make takes its place in the web of nature, as you make it.

This is why Andrew Michler’s concept of hyperlocalization is so fascinating and valuable. Because every building he shows is not only a product of its climate and its environment, but of its history, its culture, a reflection of the personalities of the people who built it and surround it. So Poundinghills is so very German, engineering-driven and mathematical, built like a Mercedes. So building in Cascadia is so woody and hippie. So houses in Japan are so tiny and betray a totally different understanding of privacy and permanence. So Danes like to move. Hyperlocalization ensures resilience. It’s based on the history of how people have built in the past, the understanding of how to adapt to climate. The knowledge of how to maintain and repair simpler systems. But most importantly it is based on a deep comprehension of culture, of how people lived and flourished in a particular place. That is something that has been lost in the last few decades. Hyperlocalization is a demonstration that in fact we can learn the lessons from the past and use them as templates for the future.

Andrew Michler and I have danced together around the blogosphere for years. The popular architectural blog world is full of tiny houses and shipping containers and wonderful but imaginary towers, all lovingly pinned and facebooked and tumbled and huzzared and slideshowed. Andrew’s work popped out as different; it’s clear that he knows something about actually building things. His writing reflects his experience and knowledge. And more.

F. Scott Fitzgerald wrote that “The test of a first rate intelligence is the ability to hold two opposed ideas in the mind at the same time, and still retain the ability to function.” Andrew has demonstrated that as well. There are two schools of thought in green building: 1) that reducing energy consumption trumps everything (hence the endless cubic yards of toxic fossil fueled plastic foam insulation in most Passive Houses) 2) that we should build with healthy, non-toxic materials that are resilient and flexible. There are two schools of thought in green building: 1) that reducing energy consumption trumps everything (hence the endless cubic yards of toxic fossil fueled plastic foam insulation in most Passive Houses) 2) that we should build with healthy, non-toxic materials that are resilient and flexible.
He lives and teaches in Innsbruck, Austria.

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With the Passive House, we accept our need for a perfect interior climate, so now based on the local climate, our envelope has to be designed in order to be able to use a very low-impact technology on the inside. Such a concept of course leads to different types of solutions in the different climates. That's what many people find hard to understand and they state, "We have to redefine passive house for different climates." But no, we don't, because it's the same equation, the same underlying physics. It is the solutions that are looking very different depending on the climate and depending on the boundary conditions in the individual circumstances. This is how we understood it when we first began because this is how physicists think. We think in general terms and try to find a general rule or principle behind it. That's a good idea to do that in this way because now you can deconstruct, we now know the method for the solutions, which can be found in every place relatively easily if the method is once figured out. That's what the scientists at the Passive House Institute have done, and they made the method with a very simple tool available for everybody. It turns out that given the limited technology that people had in the past of course they did a good job with regional traditional design. There have been different types of architectural heritage in different parts of the world, and of course it had something to do with the local climate. They knew how to build for the local climate given the technology at that time. Technology has changed now, and this is also something we have to take into account, we are not against modern technology; on the contrary, we should use modern technology, but use it in a wise way. It is still good to reduce the overall amount of additional technology because in the end it will not provide satisfactory results. You can see that in most buildings now where there are over exaggerated technological solutions for the indoor climate. Buildings that were never adapted to the place that they were built only to rely on these systems. What I think about technology is that it should be used in a clever and responsible way. That's not easy because sometimes people just love the complex things. And there is another tendency in an industrialized society to keep things the way it has been. Some of the complicated things we have kept I think have been artificially designed by the chance that technology has taken. When you reflect back on what we did with Passive House, it is not as difficult as you envision at the first moment. It's about the difference between what is done normally, like for windows where we go from a single pane of glass to three—that seems to be a big step, but a few years later it just becomes normal. It's normal because this is not complicated, it is not difficult, it is just different. I believe that Passive House has worked because firstly it all has to be based on solid science, speculation does not help. You need to be skeptical and you need to scrutinize what you are doing. A lot of people just advertise what they want to sell and people are somewhat fed up with that. And then there has to be a demonstration so that you can see that it is working. You need to build it and it needs to work. That's why the science behind it has to be resilient; and you need to do it everywhere, not just in one place. You need people who are enthusiastic about it and engaged and you need to communicate about it. This is how our institute works, we work on the scientific level and we disseminate. Everything we have done so far has been published. We don't just publish on a scientific level but in formats for the craftsmen, architects, engineers, and others to use it for their own work. I am very positive about this and maybe that's an attitude of physicists. We have seen from theory that this is possible, and from actual development we have seen it's really working.

The Heat Recovery Ventilation manufacturers, for instance, had been very skeptical at the beginning but now some have certified almost all their units. They realized that these performance numbers are exactly what you need to be in the market. They realized that because our testing methodologies are based on real conditions in real houses.

Dr. Wolfgang Feist

The main principle behind Passive House is to look at what we call the energy services. This is what you really want in a building to stay comfortable. You want conditions to be as healthy as possible inside; you want to have fresh air, daylighting, and things like that. So these are the conditions defining what you want to design for. This is worldwide, based mainly because of two facts: the first is that the physics ruling all of this in the same everywhere, and the second fact is that the comfort people want to have is also the same. Therefore, the inside is almost always at the same conditions, although there are cultural differences that one has to account for, of course. What is not the same are the external conditions—we have different climates. What is also not the same is the cultural heritage, so there are different ways to construct a building. So that led as to a performance-based standard looking at these climatic conditions on the inside. These inside conditions give us a very simple kind of equipment, what is really needed. The outside conditions define the kind of effort we have to take to reach the goal of thermal comfort.

It's a completely different approach from what has been done in the past where you just do your envelope to separate the inside from the outside and then in order to create a tolerable climate inside you apply additional technology. When your design is based on the technology to create an adequate climate the construction of a high-rise glazed tower in Sydney and in Hong Kong and Jakarta is the same as the one in Montréal. That of course will give you very high energy consumption in different climates for different reasons, because it's too cold or it's too hot or you have too much of solar radiation. Additional technology can correct for these errors, so that allowed one to create basically one design and bring it in by helicopter to the different sites. That was the kind of thinking that happened all through the world, and it is completely the opposite of a Passive House. It's only possible, because energy was thought to be and to stay extraordinarily cheap.
When you think back in history the first scientists like Galileo, Newton, and Alexander von Humboldt, they thought about the conscience you get from science. They thought about the spiritual component to science, it was not simply about technology. It is not bad to create technology but it is very necessary to reflect on its impact. Now science is industrialized where it is used to develop new products and to service industry. There are two impacts as a result. The first being that it is getting boring, it’s just about money like everything else. But there is much more to science of course than money, it is about getting to know how things work, it is fun. The other side is that of course it is important to act responsibly. So, if there are two paths to getting good indoor climate, one is using fossil fuels and the other is just inviting your building in; then I think there is no choice which path to go.

I think most people don’t understand that yet. It seems to be a little too abstract. But when they see the building that only consumes 10% of the energy they are surprised and wonder how that can be. I think this is because they have been told their whole life that the more energy you have the better your living standard is. Now we understand it’s not about how clever you can do things and that you can provide this with very little energy demand, what is just the part of the energy, you are losing to the environment.

It seems that people may need a gentle reminder of the big picture from time to time, and I am open to engage that way. What we really want to emphasize is to use these grassroots developments, which take off. I would like to see them create solutions in their environment, and it is very satisfying to see that this is possible. The solutions we have looked for are not so difficult—it can be done. It can even be done by a farmer in Namibia building a straw bale Passive House building. This may not be the solution in the US or Europe, but it could be the solution in some places. So, distributing the science behind it can help to find local solutions that are much better than what they had before.

And then there are projects that are about scale like Heidelberg–Lahnstadt, which is a very good model for industrialized high-density urban development. I very much enjoyed walking inside the development because it is all pedestrian. You can send your children to the playground and you won’t have to worry about them crossing a busy street for instance. In a project like this it already changes the attitudes.

Now, often what we talk about is technological, but these things change the general attitude. Passive House is only a small part of that: there are things that are more critical like the pedestrian area. But, it did instill confidence that a low impact community can work.

Climate change is an existential crisis. There are species that are dying out right now because of human activity. I do not like this, but we might be able to live as a planetary society with a fraction of the existing species. If we heat up the planet 0.5°C it is a problem for our industrial society because we won’t be able to live the way we do now. This is why we have to change the path there have to be solutions for this problem. This will have to be resolved either way, by design or by warfare with people fighting over resources. They won’t be conscious of why they’re fighting. It quickly becomes just a light—and people lose their minds, like they have done in wars throughout history. I am convinced that we have to resolve this problem before things get really nasty.

So this is why we should not have arguments about whether it is better to insulate or to install solar, we need both. Sometimes I’m a little bit surprised about this enlightening between different approaches. I know that we need to be very tolerant.

It is important to think about designing issues with the least impact possible, and in most cases it means thinking local. Let’s look at energy again; we can create locally produced energy, which are incorporating into our standards. The more localized you try to make your primary energy the more energy you have the better.

Imagine how many buildings we would have to build if you get the big picture. It’s not a thing in which you have to rely on an expert, it empowers the way you can design a building. Once built we can measure how the Passive House performs, that’s when people feel empowered and not just dependent on some experts. In the end, I believe this will be the biggest change. Going back to Carl Sagan, this is that idea that we all have the capacity to understand science. 39
GERMANY MAINTAINS KUNSTMUSEUM RAVENSBURG
Walking though a Stuttgart neighborhood to visit UN Studio’s wondrous metallic knot, the Mercedes-Benz Museum, I come across an ortho- envive rather ordinary building which catches my attention. It is a new three-story apartment with pale stucco and an innocuous entrance, but the windows sit deeper in its wall than a typi- cal building and then there is something about how it was shaped. I approach the textured stucco skin wall to give it a rap with my knuck- les. Rather than receiving the expected thud, the resonance was like a reverberation that you would get from a very tight drum. It is the sound of 250 millimeters of insulation exquisitely sep- arating the inside from the outside, providing verity that this apartment is built based on Pas- sive House principles.

This same result is confirmed at a massive Passive House development I visit on my way back from the Passivhaus Institut in Darmstadt the next day. Bahnhofstadt, named after its proximity to the train station in Heidelberg, is a dozen or so sizable projects still under construction. Since it is dusk and the building crews are gone, it is the largest project of its kind in the world. It is the largest project of its kind in the world.

While the original super-insulated houses were in the conservative world of construction, the sea change in how we understand energy efficient buildings. The level of control of the elements is the key, and environmental building starts with a fundamental understanding of how environments actually influence buildings. The deeper intention of localizing our architecture is to maximize the inherent conditions of the site. These projects are based on a deep but ac- cessible understanding of how we conserve and extract the energy we need from the immediate environment around us before we rely on out- side, typically very dirty sources of energy. Shov- ing great restraint, Passive House is the analysis and execution of the meticulous balance of heat losses to the exterior with heat gains from the sun, occupants, and electrical devices. The same works in reverse to keep heat out when needed.

The Germanic quality of intensely focusing on the core stringent efficiency goals has opened up a spectrum of new building typographies that exist in quality and energy mismatch. While the original super-insulated houses were developed in the 1980s in the upper Midwest of the US, the principles were refined and systemat- ized by Bo Adamson and Dr. Wolfgang Feist in Europe. Dr. Feist went on to develop the system, first at the University of Darmstadt, and then founding the Passivhaus Institut to focus on re- search and the certification of buildings.

Grassroots movement of Passivhaus has ap- proached the consumption of energy from the opposite side of the spectrum. Design a build- ing’s shell that steeply reduces energy use to the point that its savings in ongoing operating costs justifies the added expense of the envelope over the life of the project. Create conditions where a minimal amount of technology is needed for the building to operate. That equation translates to 80% less than what typical new buildings use to heat and cool the interior. Keeping con- trol of thermal losses and gains can be complex and stubbornly subtle, so a Passive House leaves little to chance. This discipline of maintaining has inspired entire industries. While becoming codified in some cities and regions, the stan- dard has also pushed the agenda of very high performance far enough that many companies have noticed and supply products and services to meet the ever-growing demand.

The primary strategy is to use a few hard and fast but stringent energy thresholds: 15 kWh a year per square meter heating and cooling, 12.2 kWh per square meter for all other energy loads and an air tightness of .60 air changes an hour at 50 pascals testing pressure. The system is non-prescriptive in that the designer can choose how they want to achieve the thresholds. It is the meeting of the internal environment and the exterior world with care. The Germanic quality of intensely focusing on the core stringent efficiency goals has opened up a spectrum of new building typographies that exist in quality and energy mismatch.

The Passivhaus Institut, founded in the 1980s by Bo Adamson and Dr. Wolfgang Feist in Europe, has developed two distinct but intertwined paths. The broad demand for innovation in products and systems has accelerated turn- overs and innovations. The Germanic quality of intensely focusing on the core stringent efficiency goals has opened up a spectrum of new building typographies that exist in quality and energy mismatch.

This promise of a very high performance building comes with a steep learning curve, and even after thousands of certified projects across the world with some 50,000 built to or near the standard in Europe, the evolution of products and construction methods is constant. The great- est, or maybe only, leap of faith in Passive House is that by making it so rigorous, architects embraced the challenge rather than scoffing, cre- ating buildings which perform to the theoretical limits of building science by exploring the entire gamut of thermal performance. The other key goal is comfort. I asked Dr. Benja- min Krick, head of component testing at PHI, to help me describe the meaning of comfort in Pas- sive House. Surprisingly he did not have a sug- gestion. Explaining the metric to minimize the mean temperature gradient of internal surfaces to vastly improve comfort and curb compensa- tion in heating does not help. Think of being barefoot on a concrete floor in winter. Even a warm room will not make up for the discomfort from the lower extremities, so typically we will boost the heat to compensate. In Passive House a significant level of insulation is used to make those surfaces similar in temperature. The same principle applies to the windows. They are not designed to just save energy but reduce radiant heat loss from bare skin and provide another path to maintain thermal well-being. This is a situation few experience for any amount of time in a typical building, and for those in a Passive House it is almost purely experiential.

Arguably, from an energy perspective, no other system has come close to creating a platform that revitalizes the building science sector. Per- haps the ultimate nod is the codification of Pas- sive House in many municipalities in Germany. The drive towards a principle rather than a technology has created two distinct but inter- twined paths. The broad demand for innovation in products and systems has accelerated turn- overs and innovations. The Germanic quality of intensely focusing on the core stringent efficiency goals has opened up a spectrum of new building typographies that exist in quality and energy mismatch.

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The integration of a Passive House certified museum into the fabric of a medieval city challenges the identity of architecture by bridging 500 years of vernacular with a single gesture. The museum maintains the fabric with a nod in material and form, but resolutely avoids mimicry or nostalgia. If you quickly walked past it you may not even recognize it is of our era. The barrel vault roof relief and rich, historical brickwork allow the mass to slip into the old, dense neighborhood with only a whisper and wink of the contemporary on the outside.

Pass the first-of-its-kind revolving door and you’ll find a familiar 21st-century interior. Crisp white rooms host 20th-century Expressionism and Contemporary art in a nearly hermetically sealed container. Three floors for display and a basement are made for a tidy program, one that does not attempt to distract from the contents. The tapering brick vault ceiling pulls you out of the airy space and plants you back into the outside.

The museum’s effort not only bridges the past with the present, but stretches into the future by embracing the challenging energy standard of Passivhaus which originated only 350 km north in Darmstadt. By incorporating extremely low energy use, integrating not just the true but also the real use of thermal mass with thorough insulation, the museum stretches the possibilities of inferred vernacularism comfortably into our contemporary understanding of high-performance building. In a stroke the museum maintains the fabric of the town while maintaining an interior energy flow, a kind of radical conservatism.

The idea for building to Passivhaus standards came from the investor. He asked if this would be a good idea because there are not many museums in Europe that are Passivhaus certified. We wanted to make it an experiment, to see if this works or if it does not work. At first we hesitated because we had no windows in the museum. Normally you need to have windows to get energy from the sun. So we tried to make a Passivhaus without windows, which is unusual and a little bit complicated. We did a school building as Passivhaus and it had a lot of windows to the south, so we could earn a little bit of energy from the sun. Because the museum is so small, we wanted to have closed rooms. The pictures do not need any daylight, so we maintained closed walls without windows in the galleries. It seemed at first to be counterproductive to the idea of Passivhaus.

For a long time we tried to make buildings with a lot of mass, like an old steamboat that takes a long time to stop. So if you have a very heavy building, like the old buildings, it takes a long time to get cold, or in the summer to get warm. So our idea was to make a very heavy building, which reacts very slowly to different climates. We have used this type of building for some 20 to 30 years, and now the investor came and asked if we can combine that with Passivhaus. We tried it and it worked.

We did try to incorporate Passivhaus in an earlier museum in Frankfurt because all buildings are going to be Passivhauses there, but it was too complicated. So we started again in Ravensburg and solved the problem, which was very technical. For instance, because the insulation was so thick, we needed unusual anchors to hold the brick veneer. There was no product on the market because this is not normal construction for Passivhauses. There are other things that normally do not work with Passive House, like the revolving door at the entrance. This was very complicated to design, it was like getting a PhD. Normally you would have two doors and an airlock, but if you make this in such a small building you need four meters to make it work. If both doors are open when a group enters then the airlock does not work. We thought it would be better to make this revolving door to save space. The manufacturer of the door designed it with the help of the Passivhaus Institut, the architect, and the developer. It was a long process, about two months, to design and discuss how the door would work. Because half is outside and the other half is inside, it needs to have a thermal break in the middle. At the point where the door revolves you cannot divide it, this is the weak point. You come to problems that seem very easy to resolve, but when you’re working on it, it becomes very complicated. All those little things which you do not think of before, you say, “Ahhh, it’s no problem,” then you come to it and you have to think about it.

In Germany, architects are trained in construction at the university, it is a main part of our education. Normally we do everything from the designing to the surveying, which is typical for German architects. So we have to know a lot about those technical things and work with the construction details. I think that is why Passivhaus is successful in Germany because these two things come together. In the German-speaking countries like Switzerland and Austria, there are a lot of experiments with Passivhaus. Passivhaus does feel like taking a risk, but taking a risk is normal in architecture because you have to take something.

I think the developer values the marketing and the contractor can claim they made the first museum in Passivhaus. It’s a little bit like the auto industry where if they are in front of the technical process they can sell cars. With buildings there seems to be a similar interest to make it technically perfect, save energy, and if we can do this then there is a market. For me, I know this building saves a lot of energy and that is what counts. The lighting is all LED, and because we did not like off-the-shelf lamps we combined it with the construction. In the classroom
we designed the lamps because this is something we also like to do. We put a lot of effort into the staircases. The emergency exit is like underwear; we like to have very nice underwear also.

Every person who comes into the building is like a little oven, and the museum expected to have 25,000 visitors in one year, but in the first two months 20,000 people came. This was a little bit of problem because they were all heating the building too much. This is also a problem in general with Passivhaus because you have to plan for how many people will be in the space. There is a radiant cooling system in the concrete ceiling and very slow cooling is happening with the fresh air system. The ducts are behind the lights in the ceilings and walls. We didn’t want to show how the system works. To control humidity, we have a “big machine in the cellar” (laughs) and I don’t know how it works. It was a problem for engineers to solve because it’s too complicated for architects.

Our approach to the design was based on two things. We think it is better not to think in terms of times, only to make a good building. Ravensburg is a very nice town and we were allowed to contribute to it. It is like we started with a cake and we put something on the cake. Our building is a continuation of the town. And the second idea is using old materials. Until the 20th century, people used old buildings to build new buildings, starting with the Greeks then Romans, and into the Middle Ages, and even after the Second World War people built with the materials from the ruins. This is one aspect in which we are very interested in, that’s why we used these old bricks. The bricks came from Cologne. We have a customer there who knows we like old materials and he bought them for us. We used normal construction, construction that existed 120 years ago. When you first see the building we hope the first impression is that it’s very normal, very common. It starts with a second look, where you may think to yourself, “Oh there’s something funny!” How people come through the town to the building at first is very important. There is a little courtyard between the street and the building. It’s good to have such a courtyard because it is a little more silent than on the street, people can gather before they go into the building. When you see the profile from the outside you want to go inside to see more of it. Again, it is old construction, very handcrafted. It’s not industrial and it works well with the old buildings around it, which are handcrafted.
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GERMANY MAINTAINS KUNSTMUSEUM RAVENSBURG
ABOUT THE AUTHOR

Born and raised in Oakland, California, Andrew Michler, LEED AP BD+C, CPHC, found his way to a pine forest in the Colorado Rockies where he has lived off-grid since 1995. Merging work in design/construction, visual arts, and sustainable building research he has written extensively about sustainability in architecture.

His research has also led him to investigate Passive House. He designed and built the first international certified Passive House in Colorado which is free of foam and other toxic materials. Michler consults, through his firm Baosol llc, on low impact and adaptive building design and materials.

His wide-ranging exploration of design and environmental impact has led him all over the world. Exploring the edges of contemporary environmental architecture has helped Michler come to terms with the complex relationship between our built and natural environments.

More about his work www.baosol.com

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The promise of environmental architecture is here. An extensive pattern is emerging, where the most innovative of contemporary building design is a response to place. Instead of overcoming nature and supplanting cultural acumen, hyperlocal architecture embraces the complex intertwining of the site, people and environment.

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