

CopenHill - can industrial buildings be both pragmatic and utopian whilst maintaining architectural merit?



Figure 1: Aerial image of CopenHill, BIG, 2019 (Lufffoto, n.d.)

As each year passes, mankind's struggle against climate change grows, and is slowly growing out of our control. One might argue that every aspect of the way humans live, behave and interact must change or at least adapt to regain control and achieve environmental balance.

Architecture must learn to adapt - there is no doubt about that. But can architecture adapt in such a way where current architectural typologies and merit are maintained, or does change necessitate a new type of Architecture?

This essay uses CopenHill as a case study to discuss how the building philosophies of Bjarke Ingels and his practice BIG (Bjarke Ingels Group) inform their designs, and how these philosophies compare with the typologies of industrial architecture of the past.

Pragmatic Utopia and Hedonistic Sustainability.

As part of their manifesto 'Yes is More', BIG (Copenhagen based architects practice founded by Bjarke Ingels) challenge the theories of architectural evolution and highlight that architecture has historically been controlled and confined by two opposing extremes (Bjarke Ingels, Big Bjarke Ingels Group and Dansk Arkitekturcenter, 2010). The first of these extremes being the off the wall, crazy ideas that are often too farfetched and remain to this day a part of a sketchbook or graphics on a computer screen. The opposing extreme would be predictable, mundane, day to day architecture - often confined by plan, cost, or a lack of imagination. Ingels believes that BIG practice between these extremes and are striving to

achieve this 'Pragmatic Utopia' that is so often mentioned in his manifesto. An architecture that is idealistic in terms of its environmental and socio-economic attributes but implemented in a pragmatic way, almost as if it becomes materialised fantasy.

Charles Darwin's theory of evolution is referenced early on in BIG's manifesto '*Yes is More*'. It appropriately encapsulates the theory that underpins Ingels' architectural philosophy of how the profession must adapt to ensure its longevity. They express that conflicted interests have often resulted in design compromises and explore the possibilities that this can fuel the fire of design to create a better architecture - an architecture for the future. A wholesome architecture that encompasses every socio-economic and sustainability requirement. An architecture that can be public, private, educational, recreational and facilitate every facet of life – efficient architecture.

Another concept that hugely informs BIG's architectural philosophy and design is the idea of Hedonistic Sustainability. The concept combines the idea that architecture can create fun, enjoyable spaces and environments with the responsibility that all architects have of preserving, or perhaps improving, the quality of life for future generations (Ingels, 2016). In the past, a sustainable goal has always been achieved through some form of sacrifice. Whereas now, BIG strive to design in a way where the sustainable aspects become something that adds to our quality of life rather than subtracts from it. CopenHill is perhaps BIG's showpiece of this forward-thinking philosophy.

BIG's manifesto '*Yes is More*' and overarching philosophies adopted by Ingels introduce the idea of engineering without engines (Ingels, 2016). Buildings engineered to such a standard that they would become less dependent on machinery itself. An interesting tension and perhaps reference to Corbusier's vision of the 'machine aesthetic' (Corbusier, 1986).

Are BIG introducing a new form of architecture? A new typology?

CopenHill.

CopenHill is a waste to energy plant situated in downtown Copenhagen (see figure 2), completed in 2019 (Hartman, 2019). A power plant occupied the site prior to the involvement of Bjarke Ingels and BIG



Figure 2: Location map of CopenHill (Author, 2021)

(Ingels, 2011). The plant contributed greatly to the circular economy of Copenhagen, taking its waste, and returning it to the surrounding areas in the form of power. The CEO of the power plant opened a competition to replace the plant with another in a way that would improve its aesthetics, impact on nearby buildings and to add an educational aspect that would further raise awareness of the waste to energy process for the people of Copenhagen. This competition was won by BIG with their proposal of introducing an enclosed plant with rooftop ski slopes, hiking trails, climbing walls and a small café. Following the completion of CopenHill it now takes residual household waste and turns it into heating for up to 72,000 households and electricity for 30,000 (Hartman, 2019). Emitting only a small amount of CO₂ and water vapour into the atmosphere. CopenHill stands at the epicentre of Copenhagen's environmental ambitions.

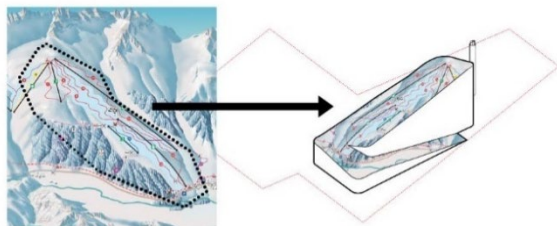


Figure 3: Diagram showing adoption of Swedish ski slopes. (BIG, n.d.)



Figure 4: CopenHill in its landscape (Ghinitoiu, n.d.)

The ski slopes on CopenHill are heavily inspired by the Swiss Alps. (see figure 3). Residents of Copenhagen would frequently travel to nearby Scandinavian countries to ski, due to the lack of mountains in Denmark and at over 100m tall, CopenHill stands above any infrastructure, or landmass for miles around (Hartman, 2019). CopenHill improves Copenhagen in terms of its extreme sporting credentials and links strongly with the philosophical thinking of hedonistic sustainability. The erection of CopenHill means there is now a man-made ski slope in the centre

of Copenhagen, providing skiing opportunities all year round - an artificial landmass proving new opportunities. A gift to the city?

CopenHill embodies BIG's vision for the future of a pragmatic eutopia that adopts a fun, sustainable approach. An environmental approach that demonstrates forward thinking and paves the way for a new type of building philosophy. Acceptance and adoption of these philosophies should not, however, be sacrificial to the integrity of architecture itself.

BIG's application and use of these philosophies are not unique to CopenHill. The Mountain, another BIG project in Copenhagen, sees an introduction of an external envelope to give a contrasting use to what lies beneath it (Bjarke Ingels, Big Bjarke Ingels Group and Dansk Arkitekturcenter, 2010). In this instance the client approached BIG with a proposal of two blocks- a 10,000m² condominium and a 20,000m² parking structure. Ingels, however, decided that these could be interlinked (see figure 5), to create what he perceives as vertical suburbia. Comprising of parking at ground level, mountain top housing and an enveloped sports hall. Evidence that approaching design in this way is adaptable, showing Ingels' consistency of style, philosophy and architectural credibility.



*Figure 5: Section of The Mountain by BIG
(Ingels, 2010 pp. 78-79)*

CopenHill is largely accepted by the people of Copenhagen (Hartman, 2019). A building that encompasses the collective environmental ambitions of the city. Does the architecture and impact that CopenHill has on its landscape, therefore, fall second best to its waste to energy performance?

Would a building of this brutal, imposing (organic?) nature be accepted if it were to house something other than a waste to energy plant? And would it be accepted anywhere other than Copenhagen, in places where utopian ideas aren't at the forefront of their planning policies?

Comparing CopenHill with the typologies of industrial architecture.

Pre and post second world war industrial architecture by Finnish architect Alvar Aalto lends itself for a valid comparison with CopenHill in terms of plan, section, material choices, organic form, response to context/landscape, atmosphere and overarching architectural merit.



Figure 6: Cellulose Factory, Alvar Aalto, 1939 (Speck, n.d.)



Figure 7: Otaniemi heating plant, Alvar Aalto 1952 (Kantokari, n.d.)

Built in 1939 and 1952 respectively, (Alvar Aalto, 1975) the above schemes (shown figures 6 and 7) are examples of the power plant in its most primitive form. Dirty, polluting industrialism, striking huge contrast between wartime environmental agenda and our ambitions today as we strive toward a zero-carbon future.

The Cellulose Factory, located in the south of Finland, like CopenHill, is an example of Scandinavian industrialism located near working docks and marine areas (see figure 2). Both examples are stand-alone structures that exist independent of any nearby buildings. Both are abrupt in the way they sit amongst their industrial landscapes.

BIG's vision for CopenHill sees an overlap of functions. An activity-based rooftop morphed over the industrial machinery, in its conquest against climate change. Aalto's design approach on the other hand, (see figure 8) adopts a more traditional layout. An organic separation of elements and functionality. A clear division between residential and industrial units, with a controlled integration of working environments such as offices and laboratories. (Alvar Aalto, 1975) The careful, calculated differences in architectural style and flow

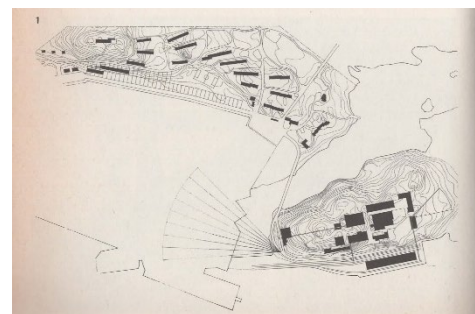


Figure 8: Cellulose Factory Site Plan (Aalto, 1975 pp. 140-141)

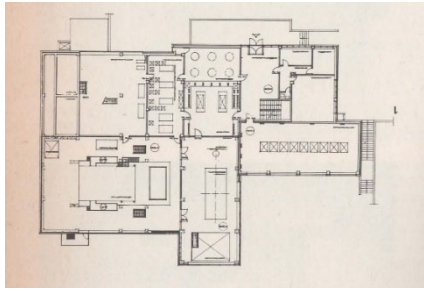


Figure 9: Otaniemi Heating plant ground floor plan (Aalto, 1975 pp. 144-145)

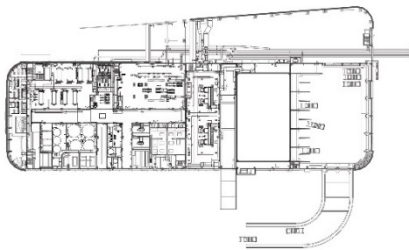


Figure 10: CopenHill ground floor plan (BIG, n.d.)

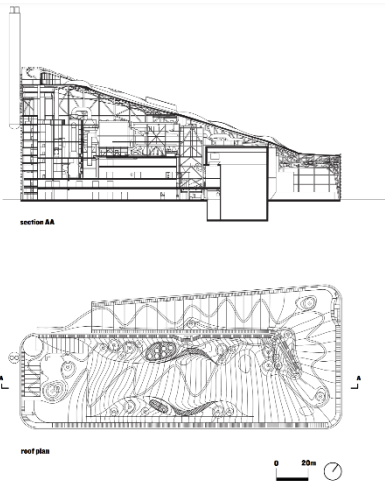


Figure 11: CopenHill rooftop plan and section (BIG, 2017)

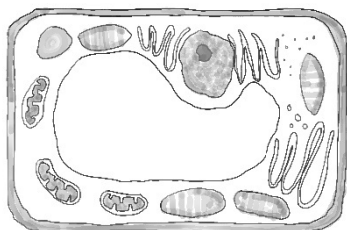


Figure 12: Cell structure of plant sketch (Author, 2021)

allows both CopenHill and Cellulose factory to be viewed and experienced as two separate entities - each with their own identity. Both schemes consider the interaction and tension between industrialism and everyday activities but have used the plans to delineate this tension in opposing ways. Is this Aalto's very own adoption of Ingels' design philosophy, some 35 years before his birth (Rawn, 2018)?

Or is this just good design?

Whilst similar to CopenHill in its functionalism, the plans of the Otaniemi Heating Plant (see figure 9), differ due to Aalto's willingness to break away from a regular footprint to create organic, more fragmented plans. Creating relief within internal spaces has resulted in a more breathable plan.

CopenHill's ground floor plan reads as though it is confined to its rounded-rectangular footprint (see figure 10). The outer shell also houses vehicular access not to diminish the stand alone, mountain aesthetic that Ingels hopes to achieve. In architectural terms the layout of each floor plan other than the rooftop plan are purely functional. Arranged around a central circulation space are a series of mostly rectangular spaces that house each element enabling the function of CopenHill. A labyrinth of machinery that provides the building with its production of energy for surrounding suburbs.

The real architectural merit (or lack of) for CopenHill lies in the rooftop plan (figure 11). A complex, organic plan with a ski slope as its primary function, in complete contrast with the busy, cluttered floors that lie within. Careful weaving of walking and bike trails among areas of high biodiversity are a credit to BIG and collaborators SLA architects for maximising the use of the rooftop parkland.

The rooftop plan is reminiscent to the structure of plant cells (shown figure 12). Exploring the idea of CopenHill as an organism, both in its layout and function - a sort of living building if you like. A complex of features swimming on a free-flowing footprint contained within the outer aluminium skin and steel framed structure. The section speaks in a way much the same as its plan (see figure 11). A functional under belly of industrial makeup and a gradually sloped rooftop to provide CopenHill with its hedonism.

What is clear here is not so much what BIG have done with this scheme, but rather what they have not done. Convenience would have lent itself to placing a flat roof over the main body of the plant with the extremities situating as fragmented units around this central core as shown with Aalto's comparative examples. Ingels has clearly worked hard at creating a seamless exterior to achieve this landmass-like entity.

With any building or structure, the materiality and the way they are used are imperative to the success of said building in terms of its architectural aesthetic. The appearance of CopenHill is striking if nothing else. Its facades are faced with an alu-brick skin (figure 13), resistant to sea water, humidity and steam. This element is integral to the futuristic appearance of CopenHill. A consistency of material that draws the attention to the flowing geometric forms.

It's hard to imagine CopenHill as being anything other than imposing as you stand at its foot waiting to be carried up in its ski lift. An abruptness that is almost inorganic with no attempt to soften its approach - something that often comes naturally with real mountain ranges. An atmosphere that could possibly be quite austere, not as welcoming as might be expected.

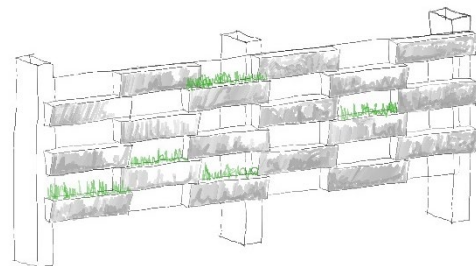


Figure 13: Alu-bricks with integrated planters sketch (Author, 2021)

On the other hand, an honesty of material choices must be respected. It does what it says on the tin so to speak. An honesty that is also evident with Alvar Aalto's architecture. Although implemented with a more traditional architectural style, contrasting greatly with that of Ingels'. CopenHill's materiality dynamic is shown in figure 15 - where artificial rooftop greenery meets alu-brick façade. An interesting tension between all things artificial.

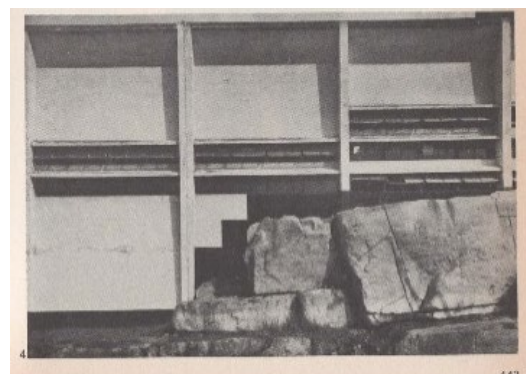


Figure 14: Cellulose factory materiality (Aalto, 1975 pp. 142-143)



Figure 15: Ski slope perspective view (SLA, n.d.)

Brick, concrete, and stone used in both of Aalto's schemes have an almost earthy, grounded feel in complete contrast with the aluminium shininess of CopenHill. Aalto's architectural style sees an organic aesthetic of dispersed planes and elements that anchor his schemes in the ground. The architecture then appears to grow from what lies beneath the ground and establishes itself as a building - typical of organic modernism (shown best figure 16). CopenHill is clearly striving to be organic, but the stylistic differences set it apart from the Otaniemi Heating plant and Cellulose Factory by Aalto.

Is CopenHill therefore a failed attempt at organic architecture? The reality a glorified mass sent by aliens that identifies itself as a mountain? Maybe.

What is undoubtedly very important to acknowledge here is that these buildings are from different periods. Periods that are shaped by fashion and climatic factors. Ideals, tastes, and architectural perfections are ever evolving. It is evident that the industrial aesthetic remains an important part of CopenHill - or maybe more important to hide it away (shown figure 17). The interior shows very clearly the industrial elements of the power plant that would provide someone like Richard Rogers with the want to express these elements on the exterior. Interesting is the fact that Ingels has decided to use his ski slope as the 'educational' addition. What could be more educational than an honest showcase of the waste to energy technologies on the building's exterior? CopenHill is a culprit of dishonesty that would question the architectural integrity of any building, never mind a building of CopenHill's scale, presence, and coverage.

Or does CopenHill adopt an aesthetic that reflects a new movement? A new architectural approach against climate change and such utopian aesthetic is used to indicate the pioneering, revolutionary technologies and processes that lie within?



Figure 16: Otaniemi Heating plant perspective view (Aalto, 1975 pp. 146-147)

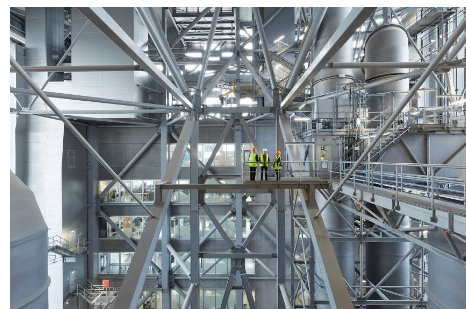


Figure 17: CopenHill interior image (Aagaard, n.d.)

Conclusion.

To say whether CopenHill carries the same architectural merit as work from the likes of Alvar Aalto is hard to say. Architecture is perhaps not at the heart of what CopenHill is all about. Its merit lies within – in the form of its waste to energy technologies. The ski slope may then be considered as a distraction. A disguise. A distraction that in fairness utilises what would normally be wasted space, introducing something new to Copenhagen.

Its authenticity may be questioned, but there is no doubting the ground-breaking approach of philosophical thinking and application of technologies. A climate change combating, utilisation of space that might introduce a new socio-economic approach where mankind reverts to a localised self-sufficient way of living.

Could this be introduced in all cities? CardiffHill? Or ParisHill? Would it have to be a hill at all?

“we must thoroughly understand the problem and begin to see the possibility of evolving a new life-style, with new methods of production and new patterns of consumption: a life-style designed for permanence.”

- E.F. Schumacher (Schumacher. E. F, 1999, pp. 8-9).

CopenHill is very much an experimental example of a new type of architecture. In total contrast to the stylistic typologies of 20th century industrial buildings. Perhaps, an example that finally sees a realisation of environmental ideology recognised as essential decades earlier.

CopenHill is a building where architectural merit, sustainability and multi functionalism are merged in a happy medium, that strive towards making utopian dreams a reality. A catalyst to reinstate regionalism and self-sufficiency, giving hope for an end to the climate change battle whilst maintaining quality of life.

In years to come it is likely that CopenHill will be regarded as a building of merit with great appreciation of its qualities – both architectural and philosophical, along with its futuristic aesthetics.

A success?

Maybe.

2740 words.

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Figure 1: Aerial image of CopenHill Luftfoto. D, (n.d.), Available at: <https://www.archdaily.com/925970/copenhill-energy-plant-and-urban-recreation-center-big/5d977fad284dd1ffa4000016-copenhill-energy-plant-and-urban-recreation-center-big-photo> [Accessed 14 Mar. 2021].

Figure 2: Location Map of CopenHill. - Author (2021)

Figure 3: Diagram showing adoption of Swedish ski slopes - Bjarke Ingels Group (n.d.) Available at: <https://big.dk/#projects-arc> [Accessed 14 Mar. 2021].

Figure 4: CopenHill in its landscape - Ghinitoiu. L (n.d) Available at: <https://www.dezeen.com/2019/10/08/big-copenhill-power-plant-ski-slope-copenhagen/> [accessed 17 Mar. 21].

Figure 5: Section of The Mountain by BIG - (Ingels, 2010) *Yes is more: an archicomic on architectural evolution*. Köln: Evergreen, pp. 78-79, illus.

Figure 6: Cellulose Factory, Alvar Aalto, 1939 - Speck, (n.d.) Available at: <https://larryspeck.com/photography/cellulose-factory-2/> [Accessed 15 Mar. 2021].

Figure 7: Otaniemi heating plant, Alvar Aalto 1952 - Kantokari, (n.d.) Available at: <https://mapio.net/pic/p-103298317/> [Accessed 15 Mar. 2021].

Figure 8: Cellulose Factory Site Plan - (Aalto, 1975) Alvar Aalto. London Thames And Hudson. pp. 140-141, illus.

Figure 9: Otaniemi Heating plant ground floor plan - (Aalto, 1975) Alvar Aalto. London Thames And Hudson. pp. 144-145, illus.

Figure 10: CopenHill ground floor plan - BIG and SLA, (n.d.) Available at: <https://arkitektforeningen.dk/arkitekten/amager-bakke-kinderaegget/> [Accessed 17 Mar. 21]

Figure 11: CopenHill rooftop plan and section - BIG and SLA (2017) Available at: <https://www.architectural-review.com/buildings/amager-bakke-waste-to-energy-plant-in-copenhagen-denmark-by-big-and-sla> {Accessed 17 Mar. 2021}

Figure 12: Plant cell structure sketch - Author (2021)

Figure 13: Alu-bricks with integrated planters sketch - Author (2021)

Figure 14: Cellulose Factory materiality - (Aalto, 1975) Alvar Aalto. London Thames And Hudson. pp. 142-143, illus.

Figure 15: Ski slope perspective view – SLA, (n.d.) Available at: <https://www.dezeen.com/2019/10/08/big-copenhill-power-plant-ski-slope-copenhagen/> [Accessed 17 Mar. 21].

Figure 16: Otaniemi Heating plant perspective view (Aalto, 1975) Alvar Aalto. London Thames And Hudson. pp. 146-147, illus.

Figure 17: CopenHill interior image - Aagaard. S (n.d.) Available at: <https://www.dezeen.com/2019/10/08/big-copenhill-power-plant-ski-slope-copenhagen/> [Accessed 17 Mar. 21].

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