CHAPTER 4

Form follows Environment: On Snøhetta's Powerhouse Brattørkaia

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Abstract: The ecological and social paradoxes of Snøhetta's Powerhouse Brattørkaia in Trondheim beg the question of what environment the developers are considering. By discussing 'the World's Northernmost Energy-Positive Building,' this chapter considers the intentions of green technology in architecture, such as: what are climate-favourable solutions; what may happen when our increasing need for sustainable power is realised through architecture; and how does this need dictate architectural form? The chapter discusses how technology is a presumed answer to the climate crisis, whether the power supply market is changing, and how nature and degrowth is interpreted.

Keywords: carbon form, degrowth, functionalism, solar power, sustainable architecture

Introduction

She had barely had time for a breather since this morning, as the usual Monday briefing dragged on. She could have a lie-in tomorrow, though. Thank God for flexitime. And thank Snøhetta for creating a relaxing garden in the middle of the office building, where she had, more than once, practiced her mindfulness routine in-between the stacks of letters that had been piling up since last year. In their latest team-building session, the life coach had taught them that meditation was 'beneficial for productivity and overall health.' Breathing in sync with the app, she could hear both the waves hitting the rocks and the trains hitting the tracks from

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where she sat. The sun was reflected on the golden aluminium, heating up her neck more than she liked. She closed the app and added sunscreen to her shopping list. Sun-damaged skin was not in fashion this season. Back at her desk on the top floor of Powerhouse Brattørkaia, she took a final meditational breath while gazing out over the fjord. Thank Teekay Offshore for deciding to move their headquarters to the top four floors where nature enhanced the office landscape, gracing the employees with the changing moods of the sea.

Powerhouse Brattørkaia's self-proclaimed aesthetic philosophy, 'form follows environment,' bears witness to this real-estate development project's ambitious goals in terms of sustainability and green solutions. But when these solutions facilitate increased energy consumption, the environmental gain can quickly become reduced to the merely symbolic.

In August 2019, Powerhouse Brattørkaia, designed by the Norwegian architectural firm Snøhetta, opened as 'the World's Northernmost Energy-Positive Building' [figure 1] (Snøhetta, 2019). The Powerhouse Foundation writes on their website that the building 'is designed according to the principle *form follows the environment*' (Powerhouse, 2018b).

Figure 1. Powerhouse Brattørkaia – 'The World's Northernmost Energy-Positive Building'. Designed by Snøhetta, 2019. Photo: Erik Børseth. Reproduced with permission of Erik Børseth and Infinitiv AS. All rights reserved. The image is not covered by the CC-BY license and cannot be reused without permission.

This catchphrase plays on the important principle of modernist architectural functionalism 'form follows function,' yet in the 2019 version, the catchphrase has been reworked and adapted to climate-favourable solutions. In this case, the need for a greater proportion of power generators from sustainable sources is realised through architecture.

Optimised Form

Specific form elements of Powerhouse Brattørkaia, such as the incline and orientation of the roof, are, according to the developers, based on environmental considerations. The roof is oriented and angled in such a way that there is an 'optimal utilization of the sun' as an energy source (Powerhouse, 2018b). The same applies to the solar panels, mounted as an extension of the characteristic roof. In the café and ground floor of the building there is an info hub describing the real-time production of energy. It describes the benefits of using the sun as an energy source, even in Trondheim where from October until March sunlight is a gift, not a given.

As such, the sun dictates the design of the building itself, and the black facade panels on the roof surface also mean that the sunlight is not reflected away from the solar panels, as it would with lighter colours. However, the black panels have no energy-boosting effect, but have rather been chosen for visual purposes, as it is easier to hide the panels when constructed in this way. At the same time, hiding the panels should not be an end in itself. After all, it is the environment that controls the building's shape—if we are to believe the developers—and therefore it should be design-friendly to let the solar panels be an important form element. The solar cells become a visual definition of the building's function. Here, technology is literally *brought to the foreground* and thus indicates that this is how to cope with the changing climate.

Further, the building's stylistic elements echo functionalism and even echo functional elements originating as far back as antiquity. The central part of the building has been opened up as an atrium with a small garden in an oval shape. This both symbolises the zero-waste ideology the building proclaims and allows light to enter the office space and the underground canteen. Daylight replaces electric light and therefore saves electricity. The

recurring trope of architectural functionalism, 'light, air, and hygiene,' can here be read as 'light, air, and environment.' The atrium is clad in gold-coloured aluminium sinus plates and has built-in flower beds in wood, filled with local wildflowers, where the employees can enjoy the fresh air and green plants in between workshops and consulting meetings. This little, green patch is also open to the public during working hours and pops up as a small garden in an otherwise black and golden frame.

As stated by the developers, the building was intended to have an urban function: 'One of the main intentions is for Brattøra to become a more integrated part of the city centre, so that the city extends all the way to the fjord' (Entra, 2019). Yet in the public media, the building has been criticised for its size, location and colour. Trondheim's planning authorities consider it to be too tall for the cityscape and not well-adapted to its surroundings (Byggeindustrien, 2017). The statement 'form follows the environment' can further be interpreted as a pretext for—or justification of—a completely ordinary commercial building by the fjord blocking the public sea view.

Prior to the building's construction, there was a line of sight from the city centre and out to the fjord. What remains in the line of sight is the solar wall between the city and the fjord [figure 2]. Because of its central

Figure 2. Powerhouse Brattørkaia – 'The World's Northernmost Energy-Positive Building'. Designed by Snøhetta, 2019. Photo: Ivar Kvaal. Reproduced with permission of Ivar Kvaal. All rights reserved. The image is not covered by the CC-BY license and cannot be reused without permission.

location, but also by placing areas such as the café, with its glass walls, facing towards the water's edge and Trondheim's nature reserve to the west, the building creates a greater distinction between the city and the sea. The building transforms the previous open sea area into a blockage. From inside the café, nature is reduced to visuality and aesthetics by the building's shiny facade, which frames it. Nature becomes something one looks at and enjoys, rather than interacting with it.

Urban Batteries

According to the developers, Powerhouse Brattørkaia is presented as a solution to a future where people have to change their consumer habits: it is '… a building that produces more clean and renewable energy over its life cycle than is used for the development, construction, operation and disposal of the building' (Norske Arkitekters Landsforbund, 2014). The organisations behind the development of Powerhouse Brattørkaia are the real estate company Entra, project developer and contractor Skanska, the environmental foundation ZERO, the internationally renowned architectural firm Snøhetta and the consulting company Asplan Viak (Powerhouse, 2018a).

According to the Research Centre on Zero Emission Neighbourhoods in Smart Cities (FME ZEN) (led by the Norwegian University of Science and Technology and SINTEF), the goal of sustainable architecture is that buildings should '… produce more renewable energy than the building itself needs [through] the use of solar panels, heat pump solutions, geothermal heat, district heating, batteries, heat storage and smart management' (Sandberg et al., 2019). In other words, the building should not only be energy neutral in total, but should also have a collective function by being a local power generator (Stene et al., 2018, p. 9). It should supply energy to the energy market, as the demand for electricity is increased through the use of electric buses and ferries or power-based heating systems, such as heat pumps.

There is a market for and therefore *power* in supplying energy. The Powerhouse is thus not only self-sufficient with electricity, but it is also a supplement to electricity production in the city. As a result, power

production is decentralised and, over a longer period of time, one imagines that the entire power grid could be privatised through sustainable architecture. Is this democratisation or the capitalisation of a basic need? The Small Power Association in Norway already has 400 private member power plants, and 200 new producers were under development in 2019 (Småkraftforeninga, 2019). Imagine privatised power plants taking control over how people live their lives if the demand for clean power is greater than the public grid can provide. Will green energy generated by architecture then become a question of social differences?

A larger market can at the same time facilitate democratisation, and it is easy to imagine a system where everyone contributes to an open market where electricity in and out of the network is measured—you provide what you can and get what you need. The energy that is not used is sold to electricity companies, where the income is used to pay for the solar panel investments. The direction this development takes may depend on legislation. In other words, green energy generated by architecture might then become a question of politics.

The Oslo Architecture Triennale 2019 tackled the issue of architecture and growth. It discussed how 'urban and architectural solutions [may work] for a world where quality of life and the environment are placed above economic growth' (Oslo arkitekturtriennale, 2019). The curator team of the Triennale also emphasised how an average skyscraper has a lifespan of 30 years. In the case of Powerhouse Brattørkaia: what will the sustainability consequences be when the building is unable to fulfil its current functions?

Another question is whether the decentralised energy hub will compensate for the use of materials in renovations and—considering the average lifespan of an office building—a new construction when the time comes. It is indeed a goal within the Powerhouse philosophy to reduce the carbon footprint in terms of materials. But when the building or materials need an upgrade, how will one solve the upkeep and sustainability calculation when solar panels are produced using fossil power and non-sustainable materials, as well as being notoriously hard to recycle? The cement industry is one of the main producers of CO_2 and the heavy construction equipment runs on fossil fuel. According to the curator

team of the Oslo Architecture Triennale, green architecture needs to be a question of *not* building—in other words, of degrowth.

Powerhouse Brattørkaia paves the way for using buildings as decentralised urban batteries and *adapting* the surroundings to an increasing need for sustainable energy production—what Elisa Iturbe calls *carbon form*. Iturbe writes that our society and built environment 'replicates the myth of a limitless supply of energy and resources that is characteristic of a carbon-fueled [sic] culture of abundance' (Iturbe, 2019, p. 13). In Powerhouse Brattørkaia, our current energy consumption needs are *sustained* by solar panels, but this form shows no inclination towards degrowth in energy supply. However, if the United Nations goals of supplying clean energy for everyone and building sustainable cities are to succeed, and thus stop climate change within 2030—is it not better to use our buildings and cities as power generators? (FN-sambandet, 2020). Instead, we now intervene in nature itself, by building windmills in nature reserves, building dams, and diverting waterfalls into pipes to meet our increased need for sustainable energy. We change nature instead of changing our cities. Can degrowth not only relate to *how* humans build, but *where* humans build? Our collection of buildings can be the answer to our common problems, with Powerhouse Brattørkaia as a leading example.

If our collective energy consumption increases at the same time because the energy is 'green', what environment do green technology and our buildings serve? Technology and adapting to the increase in energy consumption will be the developer's solution in the face of the climate crisis, rather than a deep change in behaviour to cut down on the *use* of resources, whether they are financial or natural. If form follows environment, which environment does this building follow and thus facilitate: the ecological, the social, or the economic environment?

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