

# FRAME

THE NEXT SPACE

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# THE GREEN POWER PLANT

**The eco status of sustainable energy production means it need not be hidden away, out of sight. If power plants can be woven into the urban fabric, what does that mean for their design?**

**Words George Kafka**

In the midst of the urgent need for action on global climate crises, architects and designers find themselves in an interesting position. As reported by the World Green Building Council in September 2019, building and construction are responsible for 39 per cent of global carbon emissions, meaning that the parties designing those buildings are coming under increased pressure to acknowledge their professional responsibility in the fight for the future – and to act upon it.

How they might do this is, of course, complex. The Architect's Declare campaign in the UK is advocating the use of low-embodied-carbon materials, whole-life carbon modelling, and designing for retrofit and renovation rather than demolition. Yet with signatories such as Foster + Partners continuing to take on large-scale airport projects, it's difficult to know how seriously to take the campaign. Elsewhere in the industry, however, there is a promising interest in a flourishing typology: the green power plant.

The last 12 months have seen a flurry of expressive and public-facing green energy projects completed, with many more outlandish and ambitious schemes still in the pipeline. CopenHill, for example – a waste-to-energy plant designed by Bjarke Ingels Group, SLA, AKT, Lüchinger+Meyer, MOE and Rambøll on Copenhagen's industrial waterfront – began producing energy last year and opened to the public in October. A staple of Ingels's architectural brand of 'hedonistic sustainability', CopenHill is a highly efficient facility that converts 440,000 tonnes of waste into electricity and heating for 150,000 homes annually. Unlike other waste-to-energy plants – indeed unlike most buildings – CopenHill also boasts a 9,000-m<sup>2</sup> dry ski slope that runs down one side of its mountainous silhouette. 'CopenHill is so clean that we have been able to turn its building mass into the bedrock of the social life of the city,' says Ingels.

Historically, sites of industrial energy production have largely been absent from public life and leisure, owing to their noisy, smelly and generally unsafe conditions. »



**POWER PLANT** Currently in the early testing stages, Marjan van Aubel's Power Plant is a self-sustaining greenhouse powered by transparent solar panels. The project could bring efficient energy and food production to urban rooftops and terraces, reducing the carbon footprint of agriculture.  
[marjanvanaubel.com](http://marjanvanaubel.com)

**COPENHILL, DENMARK** A competition-winning entry by the Bjarke Ingels Group, CopenHill is a facility in Copenhagen that converts 440,000 tonnes of waste into electricity and heating for 150,000 homes annually – and, remarkably, boasts a 9,000-m<sup>2</sup> dry ski slope.

**big.dk**





Rasmus Hjortshøj

Wherever more visible, these structures have been symbols of disruption and pollution: think London's Battersea and Bankside power stations and their role in the city's 20<sup>th</sup>-century smog. Elsewhere, the alien forms of chimney stacks and cooling towers have projected a sense of atmospheric threat. In fresh-faced contrast, green energy production facilities represent a safer, cleaner infrastructure with nothing to hide.

Take Giovanni Vaccarini's Powerbarn project, located proudly among the agricultural landscape of Russi in north-east Italy. Also completed in 2019, this bioenergy plant produces power using wood chips and other locally sourced biomass. With its prismatic massing and façades lined with delicate timber batons, the building cuts a striking presence, like an Anthroposcenic hangar or barn, as its name suggests. Beside the main building, a 50-m-tall chimney sits sculptural, more 3D-printed vase than looming flue stack. As with CopenHill, Vaccarini's design is considerate to Powerbarn's nearby population, with a natural embankment accessible to pedestrians and cyclists forming the boundary of the facility.

Other forthcoming energy projects are taking things a step further. Leers Weinzapfel Associates' design for the Allston Campus District Energy Facility at Harvard University, for example, is characterized by a series of metal fins. Wrapping the building's façade, the fins frame views of the interior, where brightly coloured pipes and tanks connect to a district heating system. With its central location on campus, the facility is presented as an educational and civic structure as much as an infrastructural one. Meanwhile, on the edge of Shenzhen, a mega waste-to-energy plant by Schmidt Hammer Lassen and Gottlieb Paludan will become the world's largest incinerator and a local tourist attraction when completed next year. An animated video promoting the plant shows families and young couples touring the facility, which will even feature a learning space, café and art gallery. More ambitious still is Holmene, a live proposal by Urban

Power for nine new islands extending out from Copenhagen's southern suburbs. The project is being dubbed as a new 'Silicon Valley', where landscaping and outdoor activities will blend seamlessly with green energy and technology.

The focus on the visibility and accessibility of these projects signals a timely shift in public awareness of both waste management and energy production. Rather than banishing our waste materials to an imaginary 'away place', as professor Timothy Morton puts it, these projects place energy production facilities alongside the other structures of our daily lives: homes and shops or train stations. That said, the slick PR machinery and apparent social benefits – of waste-to-energy projects in particular – can distract from relevant critiques of these plants, namely that waste is not a renewable resource and its efficient conversion to energy should not be used as an excuse to produce more of it. The widely adopted Waste Hierarchy tool, used by the EU and British government among others, states energy recovery from waste should be considered preferable only to landfill, while recycling, material reuse and, most importantly, not producing waste in the first place should be prioritized.

With this in mind, projects such as Power Plant by solar designer Marjan van Aubel, which aims to democratize the production of food via solar energy, have much more disruptive design potential. Van Aubel proposes a self-sustaining greenhouse powered by transparent solar panels. Currently in the early testing stages, the project has the potential to bring efficient energy and food production to the rooftops and terraces of urban residents, reducing the transport and energy costs of agriculture. While fun new social spaces and the heightened awareness of energy flows that grand new facilities can bring about are clearly valuable, designers are still best placed to address the causes of our climate crises at their roots; Van Aubel's Power Plant shows that the production of energy can still be socialized without having to make a mountain of it.●

**The facilities of green energy production represent a safer, cleaner infrastructure with nothing to hide**



Courtesy of Urban Power

**HOLMENE, DENMARK** Due to start construction in 2022 with full completion slated for 2040, Holmene is Urban Power's proposal for nine new islands off the coast of Hvidovre, Copenhagen. A so-called 'new Silicon Valley', the project will see landscaping and outdoor activities blend seamlessly with green energy and technology.  
[urbanpower.dk](http://urbanpower.dk)



**POWERBARN, ITALY** A sculpture-like structure set within the landscape of Russi, north-east Italy, Giovanni Vaccarini's Powerbarn project is considerate to the nearby population, with a natural embankment accessible to pedestrians and cyclists forming the boundary of the facility.  
[giovannivaccarini.it](http://giovannivaccarini.it)

## GREEN POWER market overview

- 01** In December 2018, the renewable energy directive was revised as part of the Clean Energy for All Europeans package, which is aimed, according to the European Commission, 'at keeping the EU a global leader in renewables' and 'helping the EU to meet its emissions reduction commitments under the Paris Agreement'.
- 02** A 2019 EU legislative proposal on waste set a binding target to reduce landfill to a maximum of 10% of municipal waste by 2030. This means governments and city councils need to continue to invest in alternative waste disposal mechanisms. It's one of the reasons interest in waste-to-energy technologies is growing, with the global market estimated to hit \$40 billion by 2023, according to the World Energy Council.
- 03** The reality of their waste output is literally hitting home for advanced economies – and the issue needs to be addressed at the source. Many of the developing nations that have spent years disposing of shipments of contaminated refuse – which is impossible to recycle, and often ends up being illegally dumped and polluting the environment – are now refusing to continue. Last year the Philippines sent some 69 containers of falsely label rubbish back to Canada, while Malaysia will soon return up to 3,000 tonnes of waste to the UK, US, Japan, China and Australia, among others.
- 04** According to an October 2019 report by the International Energy Agency (IEA), 'the world's total renewable-based power capacity will grow by 50% between 2019 and 2024. This increase of 1,200 gigawatts – equivalent to the current total power capacity of the United States – is driven by cost reductions and concerted government policy efforts.'
- 05** Solar power makes up 60% of the growth of renewable energy predicted by the IEA, the reasoning being that its costs will likely drop by 15 to 35% between now and 2024. This will increase accessibility, making solar power plants more feasible in many countries.