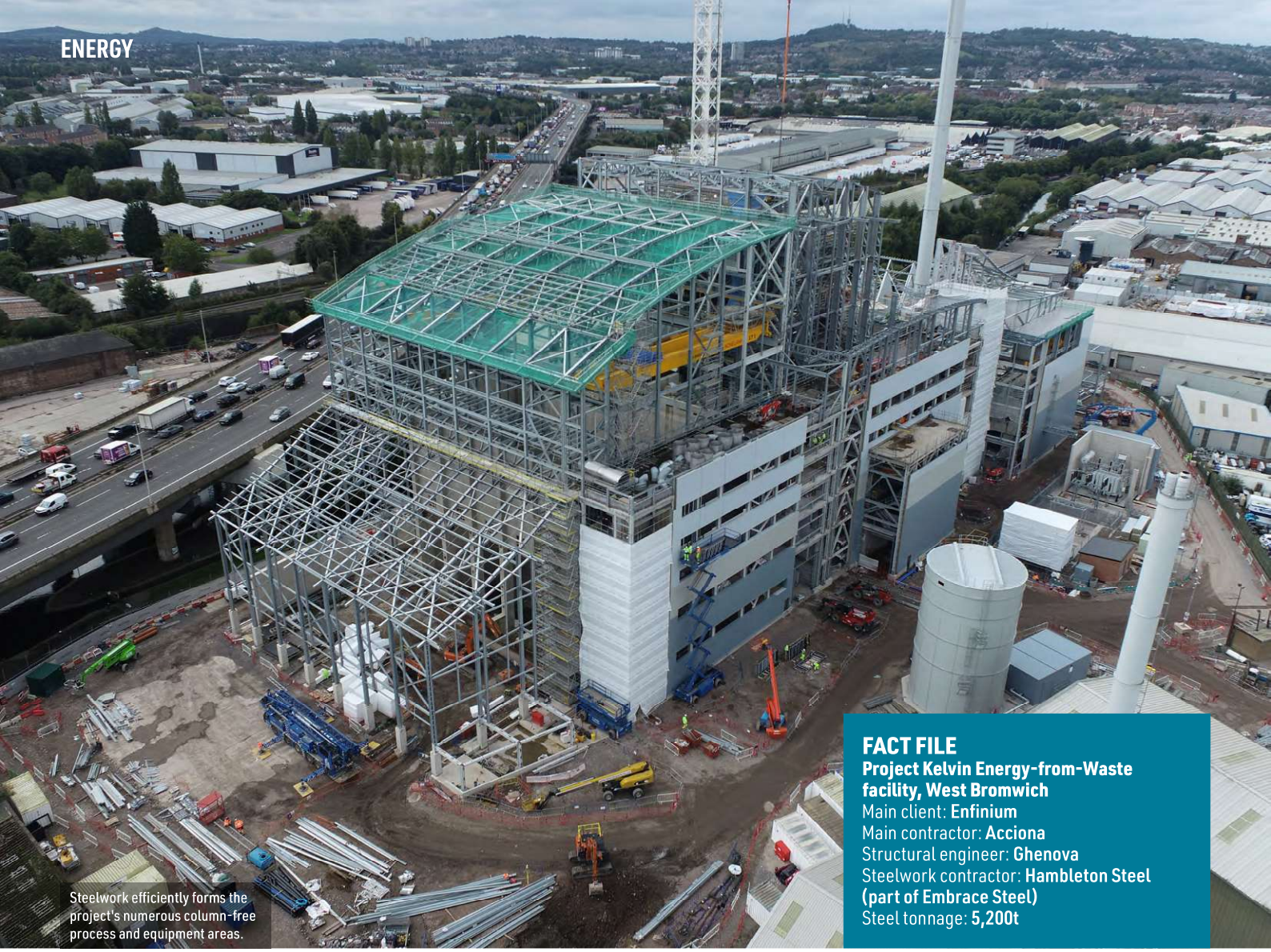


Steelwork efficiently forms the project's numerous column-free process and equipment areas.

FACT FILE
Project Kelvin Energy-from-Waste facility, West Bromwich
Main client: **Enfinium**
Main contractor: **Acciona**
Structural engineer: **Ghenova**
Steelwork contractor: **Hambleton Steel (part of Embrace Steel)**
Steel tonnage: **5,200t**

Powered up

Set to provide enough electricity for thousands of homes, an Energy-from-Waste facility in the West Midlands highlights why steel construction delivers the ideal framing solution for these large-scale projects.

Finding alternative methods for the treatment of non-recyclable waste, and investing in sustainable sources of energy are two challenges local authorites, business, and industry have faced thoughout the UK for a number of years.

As a result, Energy-from-Waste (EfW) facilities, which offer a solution to both issues, are being constructed up and down the country.

An example is Project Kelvin, which is under construction in West Bromwich. Sitting adjacent to the M5 motorway, the plant will be capable of processing up to 395,000 tonnes of residual (post-recycled) waste to generate 44MW (gross) of home-grown electricity.

According to enfinium, the project will create more than 400 jobs during the construction phase and over 40 full-time jobs once operational, bringing significant economic benefit and investment to the local area. It will also generate millions of pounds of economic activity during its construction and support the West Midlands Combined Authority's ambition to have net zero emissions by 2041.

Chief Executive Officer at enfinium, Mike Maudsley, says: "Once completed, the project will provide critical infrastructure that will support green economic growth in West Bromwich and across the West Midlands region for years to come.

"We will transform non-recyclable waste into home grown energy for British homes and businesses, as well as creating low carbon heat for industrial users in the region."

Work on the project began in 2022, when main contractor Acciona started the foundations package. This work included the installation of over 1,000 piles, the construction of secant retaining walls and the removal of approximately 16,000m³ of spoil.

Once the concrete substuctures, such as the main bunker were built, the steel frame erection could begin.

Like the majority of EfW projects, the Project Kelvin facility is housed within a large steel-framed structure. The steelwork gains much of its stability from the concrete substructures, which it sits atop and surrounds.

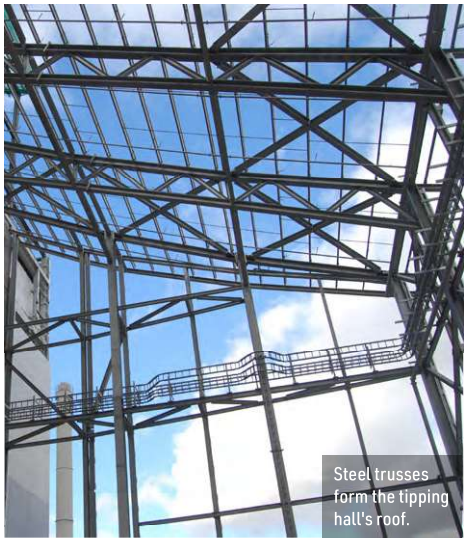
"Steel was chosen for a number of reasons, including the fact that it can efficiently form the required column-free spans necessary to house the various process and equipment areas," says Cristóbal Bartolomé Alonso, Deputy Project Director at Acciona.

"Other framing solutions would not suit our customised design, or the plant's complex geometry."

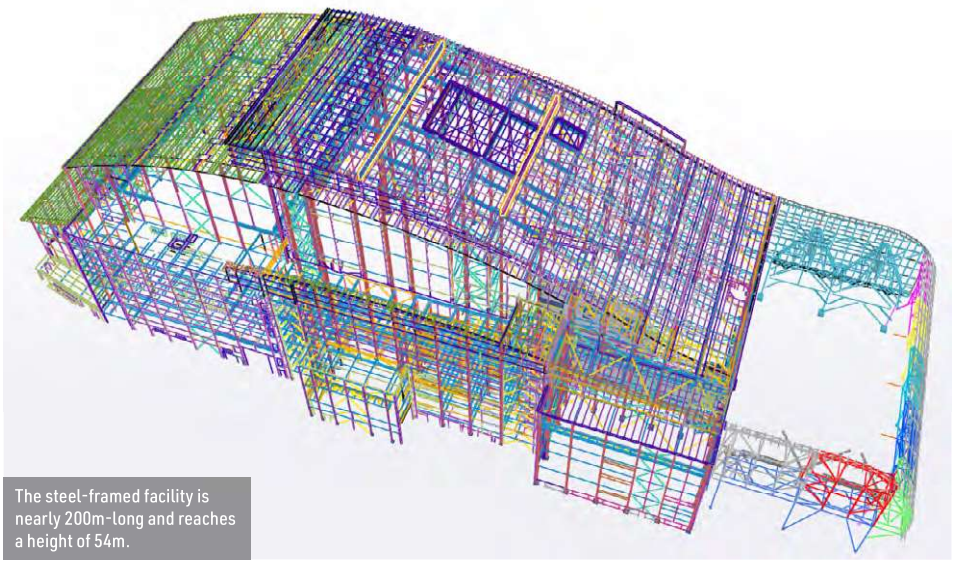
Another key consideration was the fact that the steelwork has been erected in and around the installation of large equipment items.

"The majority of the steelwork has been erected around installed equipment, but in one area of the boiler house we had to leave out some roof members, which allowed some equipment to be lifted into place," says Hambleton Steel Site Manager Andy Brookes.

"This required us to erect some temporary



Steel trusses form the tipping hall's roof.



The steel-framed facility is nearly 200m-long and reaches a height of 54m.

support steelwork, which was removed once the equipment was installed and the roof was complete."

Measuring nearly 200m-long and reaching a maximum height of 54m, the facility is divided into two halves by a movement joint that separates the aforementioned boiler house and processing zone in the west, from the refuse bunker and tipping hall in the east.

The tipping hall, where trucks will enter the facility with the waste, is positioned directly behind the bunker, while along the north elevation, the eastern end of the facility accommodates a six-storey office and plant area.

Formed with steel beams supporting a metal decked composite flooring solution, the six-storey block is separated from the adjacent facilities by a movement joint.

As no off-the-shelf members were available of the required size, large plate girder columns were used to create the perimeter of the facility (set at 8m centres). Because of the curved design of the building's roof, the columns, which vary in height, were delivered to the site in three or four sections, and spliced together.

The columns have 110mm-thick flanges, with each section weighing up to 18t.

Spanning between the perimeter columns, in a north to south direction, a series of trusses form the roof and the important column-free interior of the facility.

The western part of the building, including the boiler house, is formed with a series of 17 trusses, each measuring 37.6m-long and up to 6m-deep. Brought to site in three pieces, the trusses were spliced together on the ground and lifted into place as one large section.

To lift and place these heavy steel elements, the erection team had seven mobile cranes on site, working alongside the project's centrally-positioned tower crane. With a capacity of 27t at a 67m radius, the tower crane is said to be one of the largest in Europe.

Some of the heaviest and longest steel elements are within the roof, including a large beam and a plate girder, both of which span between the trusses. The girder weighs 37t and was fabricated in three pieces.

A plant deck was also installed near the curved roof's apex. It was erected in two 41m-long pieces.

Further east, another series of seven 34.8m-long trusses span the refuse bunker. Again, these elements were fabricated and delivered to site in three sections.

In between both sets of roof trusses, the building's steel design includes a series of smaller secondary trusses and beams that span the structure from east to west.

Within the refuse bunker, the steelwork package includes two parallel 43m-long crane beams that support the tracks of the plant's overhead gantry crane. In order to make the erection process as efficient as possible, the beams were spliced and delivered to the site in sections, which were up to 8m-long.

Adjoining the refuse bunker, the tipping hall, which is another large column-free zone, with enough space for trucks to turn around in, is formed with a series of 26m-long tapered trusses that span east to west, from the bunker wall to a row of perimeter columns.

Representing one of the final areas of the steel erection package, the western end of the building includes the Air-Cooled Condenser (ACC). It sits outside and is surrounded by a wrap-around 4m-high steel-framed screen.

The screen is supported and raised 3m above the ground via a series of column legs, some of which are V-shaped.

The Project Kelvin EfW facility is due to be operational by early 2026. ■

"Steel was chosen for a number of reasons, including the fact that it can efficiently form the required column-free spans necessary to house the various process and equipment areas."

One of the boiler house trusses is spliced and ready to be lifted into place.

The steel frame is partially supported by large concrete substructures.