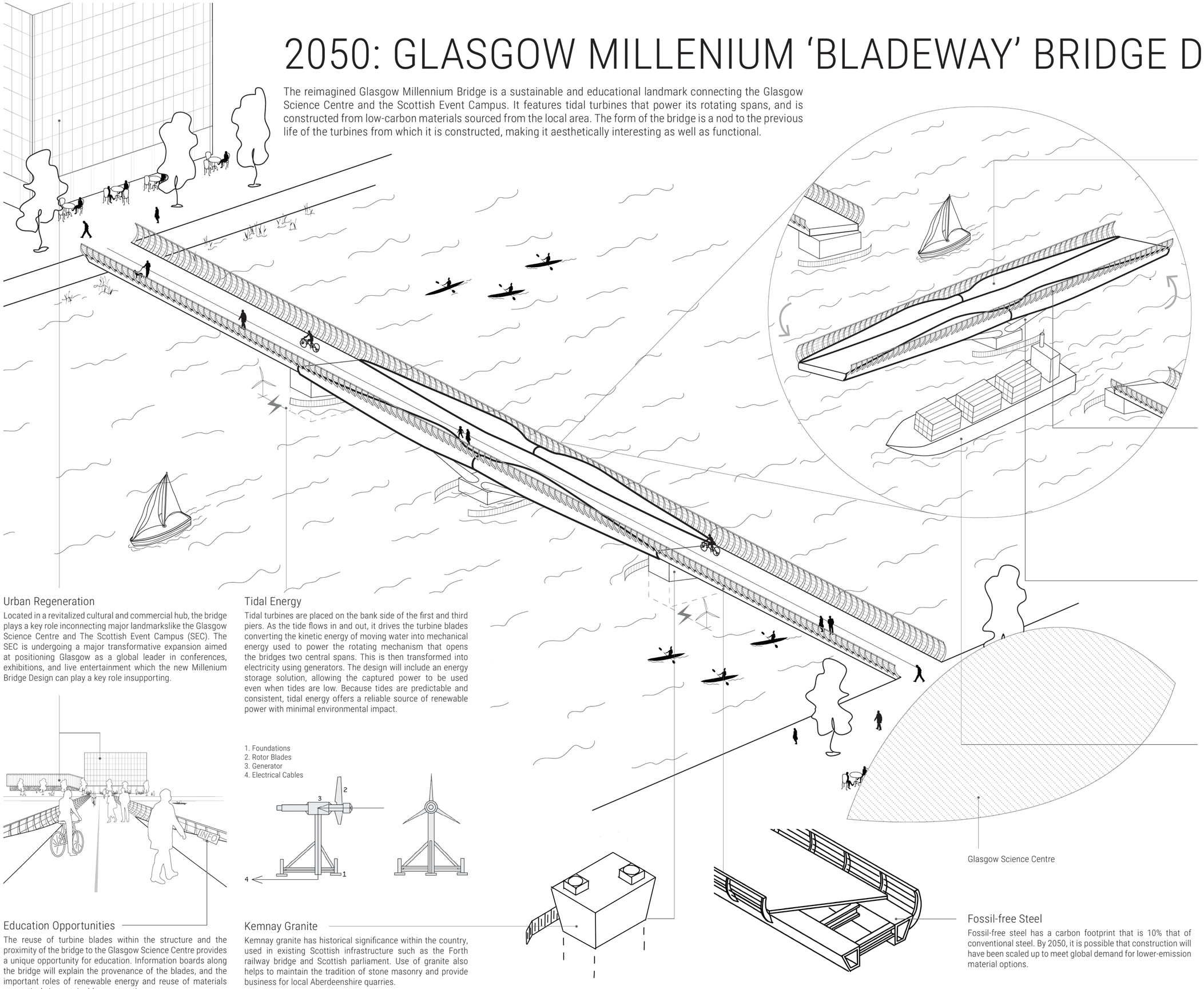
2050: GLASGOW MILLENIUM ‘BLADEWAY’ BRIDGE DESIGN

The reimagined Glasgow Millennium Bridge is a sustainable and educational landmark connecting the Glasgow Science Centre and the Scottish Event Campus. It features tidal turbines that power its rotating spans, and is constructed from low-carbon materials sourced from the local area. The form of the bridge is a nod to the previous life of the turbines from which it is constructed, making it aesthetically interesting as well as functional.



Urban Regeneration

Located in a revitalized cultural and commercial hub, the bridge plays a key role inconnecting major landmarkslike the Glasgow Science Centre and The Scottish Event Campus (SEC). The SEC is undergoing a major transformative expansion aimed at positioning Glasgow as a global leader in conferences, exhibitions, and live entertainment which the new Millenium Bridge Design can play a key role insupporting.

Education Opportunities

The reuse of turbine blades within the structure and the proximity of the bridge to the Glasgow Science Centre provides a unique opportunity for education. Information boards along the bridge will explain the provenance of the blades, and the important roles of renewable energy and reuse of materials respectively in sustainable construction.

Tidal Energy

Tidal turbines are placed on the bank side of the first and third piers. As the tide flows in and out, it drives the turbine blades converting the kinetic energy of moving water into mechanical energy used to power the rotating mechanism that opens the bridges two central spans. This is then transformed into electricity using generators. The design will include an energy storage solution, allowing the captured power to be used even when tides are low. Because tides are predictable and consistent, tidal energy offers a reliable source of renewable power with minimal environmental impact.

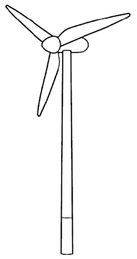
1. Foundations
2. Rotor Blades
3. Generator
4. Electrical Cables

Kemnay Granite

Kemnay granite has historical significance within the country, used in existing Scottish infrastructure such as the Forth railway bridge and Scottish parliament. Use of granite also helps to maintain the tradition of stone masonry and provide business for local Aberdeenshire quarries.

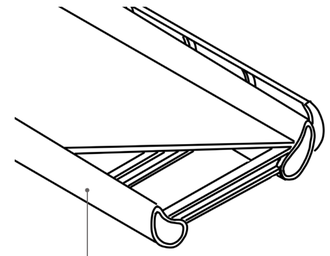
Fossil-free Steel

Fossil-free steel has a carbon footprint that is 10% that of conventional steel. By 2050, it is possible that construction will have been scaled up to meet global demand for lower-emission material options.



Reused Wind Turbine Blades

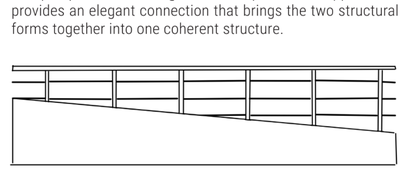
Reused wind turbine blades can be locally sourced from Whitlee wind farm. They are likely to be low cost due to the number of blades available by 2050, and the current cost (~£8,300) associated with end-of-life disposal.



Wind Turbine Blades

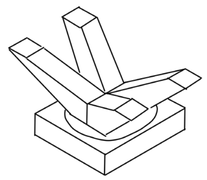
Parapet Transition

The parapet detail linking the main span to the approaches provides an elegant connection that brings the two structural forms together into one coherent structure.



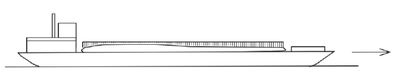
Opening Mechanism

The opening mechanism is designed to mimic the rotation of the wind turbine blades during their original life, as this provides aesthetic interest while acknowledging the previous use of the turbines.



Sustainable Transport

The bridge is designed as opening to promote future use of shipping as a sustainable mode of transportation. This fits in line with Scotland’s Green Freight Transport and Sustainability Goals. This also allows the bridge components to be shipped in during construction, which will reduce the A4 emissions associated with he project.



Construction

The bridge components will be prefabricated offsite and transported by barges from the factory up the River Clyde to the site location. Piers will be constructed on large diameter bored piles inside temporary sheet pile cofferdams. Spans are lifted and positioned onto the piers and abutments using marine cranes.