Climate Smart Forest Economy Program
BUILDING SCHUMACHER QUARTIER WITH TIMBER has the potential to avoid emissions of more than 100,000 tC over the duration of the construction stage of this project – or the equivalent of the annual CO² emissions of more than 70,000 passenger vehicles*

Notes: *A typical passenger vehicle emits about 4.6 metric tons of carbon dioxide (~1.25 metric tons of carbon) per year, this assumes the average gasoline vehicle on the road today has fuel economy of about 22.00 miles per gallon and drives around 11,500 miles per year, where every gallon of gasoline burned creates 8,887 grams of CO₂. Source(s): United States Environmental Protection Agency, Greenhouse Gas Emissions from a Typical Passenger Vehicle, 2022
Schumacher Quarter, a large timber construction quarter with living space for up to 10,000 people, is to be built on the site of the closed Tegel airport. It will provide new housing units planned and built using sustainable design and construction methods.

Bauhütte 4.0 intends to use home-grown timber, partnering with public and private forest owners to encourage sustainable harvesting practice and form the Community of Practice which will secure Bauhütte 4.0 long-term sustainability and keep it moving forward.

The long-term goal is the promotion of urban quarters in timber construction such that the climate-smart urban model can be used in future city districts Europe-wide, and globally.
POLITICAL MOMENTUM

The new German Government pledged to deliver 400,000 housing units nationwide and become GHG neutral by 2045. Addressing those two goals at the same time will be challenging, especially in the light of global geopolitical events, rising energy costs and inflation rates.

LEGAL FRAMEWORK

The timber for the Schumacher Quartier will come from forest area owned by the City of Berlin and the State of Brandenburg. It will be provided to Housing Associations at a fixed price to avoid potential fluctuations in wood prices and make their target of renting out units for a max of 6.5 euro per sqm feasible. It remains to be seen whether pre-manufactured elements can be provided in the same manner or if they would need to be publicly procured.

FINANCIAL FLOW

Processes of afforestation and ‘Waldumbau’ which is a process of transformation of Brandenburg forests from coniferous monocultures into more biodiverse mixed forests, would need to be financially supported and come with dedicated funding. Given this transition will happen over the next 50+ years, it is hard to plan for it within the parameters of existing 4-year election cycles and allocate specific budgets. Additionally, the forest sector is under pressure to produce economic value and move away from traditional low value add to higher value add products.
BAUHÜTTE 4.0 IS PLANNING TO DEVELOP EUROPE’S FIRST “FOREST-TO-URBAN” VALUE CHAIN for affordable timber housing located in the neighborhood of the former Tegel airport in Berlin.

BAUHÜTTE 4.0 LEVERAGES THE 3S FRAMEWORK (SINK, STORAGE, AND SUBSTITUTION) to develop a prototypical value chain that connects actors from forest management in Brandenburg region as the Sink, housing construction in Berlin as Storage, and building of the new residential “Schumacher Quartier” constructed with prefabricated wood components as an example of Substitution.

BAUHÜTTE 4.0 SEES ITSELF AS AN INTERFACE PROJECT TO PROMOTE THE SUSTAINABLE FUTURE OF CONSTRUCTION, it combines innovation, creativity, and design with the quality of life of citizens in urban areas by establishing an innovation and production site for urban timber construction.

ENDORSED BY THE LOCAL AND REGIONAL GOVERNMENT, the Schumacher Quarter will address the urgent need for low-cost housing in Berlin, providing around 6,000 housing units out of the estimated 400,000 needed for Berlin at the moment.

THEY ARE WORKING WITH PUBLIC AND PRIVATE FOREST OWNERS to encourage sustainable harvesting practices, with the long-term goal of building a Community of Practice of committed public and private actors working to create an enabling environment for a more ambitious uptake of regional wood products.

THIS BI COULD RESULT IN 33,000 - 63,000 tC being stored and substituted, and a further 41,000 - 95,000 tC being sequestered by the trees replacing those harvested for construction in the region over a period of 72 years.
A major focus of Bauhütte 4.0 is carbon Sinking in Brandenburg forests and Substitution and Storage in new Berliner neighborhoods. The current CSFEP breakthrough initiative represents an opportunity to fully model and analyze such value chains at a regional scale alongside our local partners.

**SUBSTITUTION:**
By substituting conventional buildings with the ones designed using timber, carbon emissions can be reduced from 122,000 tC to 13,000-14,000 tC.

**SINK:**
Bauhütte 4.0 will be using home-grown timber from regional Brandenburg and Berlin forests to supply the construction material. Berlin forests can supply the project with 10,000 to 20,000 solid m³ per year for a period of 10 years, with 50% of this, if not more, being pine, and with all wood FSC certified.

**STORAGE:**
Bauhütte 4.0 plans to create an integrated value-creation chain consisting of timber construction, processing, planning, parts production, building, maintenance, and ultimate disposal via the exchange of digital information between all the trades involved.

**KEY**

- Product flows
LEVERAGING KEY PARTNERSHIPS, BAUHÜTTE 4.0 IS SUPPORTING THE DEVELOPMENT OF A CSFE ACROSS THE 3S FRAMEWORK COMPONENTS

KEY ACTIVITIES

SINK
Establishing a local timber supply and ensuring that it would have the capacity to support the timber demand for the construction project

STORAGE
The workshops organized by Bauhütte 4.0 served as a seed point for uniting committed and willing organizations and individuals from across the value chain to set up a Community of Practice

SUBSTITUTION
An R&D center will be established for innovations in construction technologies

PARTNERSHIPS

Partnerships with the City of Berlin and the State of Brandenburg have secured a sustainable and affordable prolonged supply of timber for the houses that will be developed

The Community of Practice will build, manage and take forward value chain activities in the region, working towards the expansion of the sustainably sourced wood value chain with various partners in the private sector

The development is supported by Tegel Projekt GmbH (the state-owned company managing the redevelopment), Technical University Berlin, Fraunhofer Institute, Land Brandenburg and many other partners who are part of the Bauhütte 4.0 coalition
A crucial aspect of bringing Bauhütte 4.0 to life as an organization to be charged with developing the project further, was the community of relevant and committed participants attending workshops. Many of them will be part of setting up Bauhütte 4.0 as a breakthrough initiative.

Participants who came from different backgrounds and parts of the value chain were supported by a knowledge management and negotiation tool called an **Urban Gallery** which facilitates transdisciplinary discussions of various topics such as Forest-to-City value chain. The tool helps users manage the complexity and dynamism of a multi-stakeholder environment. **Urban Gallery** also provides planning support to structure discussions on the future of Bauhütte 4.0 future and support its implementation.

**Urban Gallery** applies gamification principles that provoke interaction between participants (players), connecting different segments of the value chain to propose new and novel solutions for identified problems and opportunities.

**Urban Gallery** consists of three main stages for content customization for each dialogue:
1) Data collection and knowledge management,
2) Scenario building and gaming sessions, and
3) Sharing of outcomes.
<table>
<thead>
<tr>
<th>From forest to city</th>
<th>From Digital Model to Realization</th>
<th>From logs to building</th>
<th>From city to forest</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Forest and Brandenburg forests]</td>
<td>[Digital Forest Model]</td>
<td>[Forest Owners and Forestry Company]</td>
<td>[Citizens and End-Users]</td>
</tr>
<tr>
<td>SUSTAINABLE B-PLAN</td>
<td>DIGITAL PLANNING</td>
<td>Carry out timber harvest</td>
<td>DESIGNERS SPECIFYING WOOD</td>
</tr>
<tr>
<td>DESIGN</td>
<td></td>
<td>Raw wood processing</td>
<td>USERS PREFERENCES TOWARDS CERTAIN WOOD AESTHETICS</td>
</tr>
<tr>
<td>HOUSING AND OPERATION</td>
<td></td>
<td>Carry out prefabrication</td>
<td>USERS DIRECTLY DESIGNING THE FOREST WITH THEIR CHOICES</td>
</tr>
<tr>
<td>URBAN SYSTEMS</td>
<td></td>
<td>Carry out construction</td>
<td></td>
</tr>
<tr>
<td>CITY</td>
<td></td>
<td>Maintain building</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Inhabit building</td>
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Here are some of the learnings over 18 months of implementing Bauhütte 4.0

<table>
<thead>
<tr>
<th>FACTOR</th>
<th>INSIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Global disruptions to value chains</td>
<td>The war in Ukraine has disrupted global supply chains, requiring a refocus on regional value chain development instead of global value chains.</td>
</tr>
<tr>
<td>2 Importance of Circular Economy</td>
<td>The circular economy theme requires a closer look at the way buildings will be created with reusable building kits, as well as the reduction of waste to zero.</td>
</tr>
<tr>
<td>3 Sufficient regional wood supply</td>
<td>Brandenburg forests have an abundant supply of wood to develop the Bauhütte 4.0. Berlin forests can supply the project with up to 20,000 solid m³ per year for a period of 10 years - at least 50% of this will be pine, and all wood will be FSC certified.</td>
</tr>
<tr>
<td>4 Need for digital models</td>
<td>A stronger focus must be put on digital models, production, intelligent prefabrication, and digital infrastructure across the value chain, including digital forest models, in order to be able to monitor the project 24/7 and understand which timber has been harvested and where it is used – tracing from the forest to the city.</td>
</tr>
<tr>
<td>5 Need for legal frameworks</td>
<td>A legal framework is needed to ensure wood can be easily traded between stakeholders, and to support administrative tracking of data such as ownership patterns. A cadastral digital twin would be a much-needed contribution because geospatial data is tied to naturally defined parameters, whereas administrative data such as ownership patterns is hard to come by.-</td>
</tr>
<tr>
<td>6 Need for incentives for small owners</td>
<td>Fiscal and other financial incentives are crucial for encouraging forest owners to join the Forest-to-Urban value chain.</td>
</tr>
<tr>
<td>7 Demographic renovation of forests</td>
<td>Introducing more deciduous trees into existing coniferous forests in order to make them more resilient to extreme weather events, insect attacks, fires, and drought and to support biodiversity. This transition to more mixed forests will happen over the next 50+ years, so the industry is able to adapt over time to the different types of timber that will be available.</td>
</tr>
<tr>
<td>8 Silviculture practises tied to timber construction demand</td>
<td>If the timber requirements of long-term planned building projects can be estimated, then silviculture can be planned better.</td>
</tr>
</tbody>
</table>
So far, in the early stages of development, Bauhütte 4.0 has been impactful in two areas:

**WORKSHOPS**

Across workshops, Bauhütte 4.0 brought together people that did not know each other before. It saw forestry companies, housing associations, architects, NGOs, manufacturing companies, and policymakers discuss different pathways wood in construction in the Berlin-Brandenburg region can take. These workshops consisted of a long dialogue process where opposing viewpoints were often heard, but this resulted in the Bauhütte 4.0 understanding the concerns raised by local actors across the value chain in the creation of a Community of Practice. Those committed individuals and organizations will form the seed of the ecosystem players that will be running the Community of Practice in the future.

**PUBLIC DISUSSIONS**

Public appearances and presentations by Bauhütte 4.0’s partners on the topic of developing the Tegel Projekt have stirred conversations in the public arena relating to the use of wood in construction. This has indicated a need for more ambitious, regular, and structured public discussions to take place.