

Online description:

Title: Constructing Ecosystems –the Tectonics of the European (Bio)Renovation Wave

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Language: English

Campus Brussels



Image: The Flat House, Courtesy of Practice Architecture (Image Credit: Oskar Proctor)



Image: The Paul Henri-Spaak Building (Image Credit: credit: European Parliament Audiovisual)

Introduction: Constructing Ecosystems

How can we build a circular bioeconomy by renovating our buildings?

With construction entering an ecological age, the material palette is shifting from carbon intense materials to natural and bio-based materials. Use of bio-based materials have a two-fold effect: they reduce the embodied footprint of the building and their value chains can contribute to the regeneration of our natural ecosystems and shared habitats. Currently new design approaches based on bio-based materials are limited in scale and impact. With this master dissertation project we want to explore current bio-economies across Europe and their future potential to provide building materials, develop design strategies and demonstrate the qualities of bio-based tectonics through a case-study project.

This assignment offers to apply a speculative, yet strategic, and integrated approach to sustainable design focused on future value chains of bio-based materials. We want to explore a design strategy and resulting architectural tectonics rooted in the emerging circular bioeconomy of Belgium and Europe. You will apply and demonstrate your design strategy on the renovation/renewal of the **Paul Henri-Spaak Building** of the European Parliament Building in Brussels, to be completed by 2035.

During this assignment you will switch between 3 perspectives and work in 3 scales.

The 3 Perspectives & Scales

- Foresight: Look ahead into the year of 2035 to understand future needs and opportunities for renovation and opportunities of the local, national, or European bioeconomy
- Panorama view: Adopt a holistic perspective to develop an integrated design strategy embedded in the eco-systematic context
- Focus on Detail: Design a modular, scalable bio-based façade cladding system for the EU ‘renovation wave’ to shape a healthy ecosystem.

The 3 Scales

Your design interventions need to address and integrate three scales to create positive, economic, ecologic and social outcomes:

- 1) Ecosystem Scale
Circular Bio-economy with related land-use and natural and industrial ecosystems as the base to develop new value chains for construction
- 2) Building Scale
To re-program the exiting building, renew and renovate its layers to meet future demand and increase inclusiveness, resilience, and community value
- 3) Component and Detail Scale
A façade construction system as a scalable solution to create demand for new regenerative value chains processing bio-based (waste) materials to building systems.

Theme: the (Bio) Renovation Wave

Over the last years, the building and construction sector - being a major contributor to total carbon emissions, resource consumption and waste generation - has moved into the focus of EU policy makers and their agenda of the “Green Deal”. With 85-95% of the building stock of 2050 being already built the “Renovation Wave” is crucial to make Europe climate-neutral by 2050. This initiative focuses on decarbonizing buildings through increasing energy efficiency for cooling and heating during their operation.

However with the urgency of climate change the focus of the initiative needs to shift from operational to embodied carbon. How do we construct building interventions? Natural, bio-based materials must be used for buildings to contribute positively to the shift from “sustainable design” to “regenerative design”. Instead of emitting anthropogenic carbon—we will work with natural carbon cycles and local regenerative materials, investigate agricultural and industrial waste streams within circular bioeconomy to inform a new mutually beneficial paradigm for renovating buildings with nature.

The Renewal of the Paul Henri-Spaak Building was subject to a highly ambitious and controversial international design competition based on regenerative design principles. You will develop a material and value-chain based design strategy and modular construction approach for its renovation. Through Bio-Renovation, you will design new value chains to benefit the regeneration of local/national/European ecosystems.

Materials Palette

All materials used should be non-toxic and healthy with following hierarchy

- Living materials
- Reclaimed bio-based
- Bio-based from agricultural/industrial waste
- Bio-based from fast-growing plants
- Bio-based
- Reclaimed/Re-used/recycled

Programme

Semester 3

Wk 4: Start

- Explanation of assignment
- Lecture/Input on bio-based materials and regional bioeconomy
- Hand-out exercise on bioeconomy mapping of agricultural, maritime and forestry bio-economies with principal flows of (waste) materials - individual assignment for Wk 7

Workshop Wk 7: Search and Speculate

- Presentation individual research on bio-economy mapping
- Expert Input on bio-based materials and bioeconomy
- Introduction to Foresight
- Scenario 2035 Workshop for bio-based (waste) materials supply with trends and drivers
- Site visit and deep-dive into The Henri-Spaak Parliament Building Regeneration to capture needs, trends and drivers
- Hand-out exercise to establish specific renovation needs for 2035 - individual assignment for Wk 13/14
- Hand-out exercise to analyze and visualize selected bio-economy value chains and opportunities for construction in 2035 - individual assignment for Wk 13/14

Wk 13/14: Select

- Presentation of regional/national bioeconomy in 2035
- Presentation of Bio-Renovation Approach for Paul Henri-Spaak Building

Semester 4: Synthesize and Systemize

Wk 1

- Presentation of programming, scenario narrative (1000 words) and key graphic

Wk 2-6

- Develop value chains of the circular bio economy
- Concept design for building bio-renovation and transformation
- Concept design for construction system
- Progress travel-log

Wk 7: Midterm Review

Wk 8-13:

- Finalize design on all 3 scales
- Outline fabrication and construction sequence and supporting value chain
- Assess qualitatively positive environmental, economic, and social impact
- Progress reflection paper

Wk 17: Jury

Methods and Tools:

- Desk Research
- Systems-Mapping
- Interviews
- STEEP Analysis (Social, Technological, Economic, Environmental, and Political)
- Expert Panel
- Scenario Workshop
- Design Thinking
- Model Making
- Story Telling / Creative Writing
- Qualitative Impact assessment

Deliverables

- Bio-Renovation Scheme in 3 scales:
 - Ecosystem Scale (natural and economic value chain), 1:10.000 – 1:1000
 - Building Scale Case-study Paul Henri-Spaak Building, presentation in site plan, diagrams, plans, sections, visualization and transformation, Scale 1:500 – 1:100
 - Bio Façade Cladding system, visualization of sequencing and material list, 1:25 – 1:1
- Summary slide deck/booklet incl. context of existing building & site (location, plans, section, photos)
- Physical Model of Bio-Renovation Scheme and material samples / experiments
- Travel-log to capture design process in 3 scales: Ecosystem – Building – Construction System
- Reflection Paper including 2035 scenario and the aesthetic, economic, ecological, technical and social qualities and outcomes of your Bio_Renovation scheme on all 3 scales applying the 3 perspectives

Links:

<https://www.unep.org/news-and-stories/speech/driving-transformational-change-architecture-and-ecosystems-healthy>

https://ec.europa.eu/commission/presscorner/detail/en/IP_20_1835

https://ec.europa.eu/info/research-and-innovation/research-area/environment/bioeconomy/bioeconomy-strategy_en

<https://www.arup.com/-/media/arup/files/publications/u/the-urban-bioloop.pdf>

<https://www.arup.com/-/media/arup/files/publications/m/materials-playbook.pdf>

https://europa.eu/new-european-bauhaus/index_en

<https://thegrowingpavilion.com/the-exploded-view/>

https://www.materialstories.com/work/made-of-material-library-39_1

<https://mogu.bio/>

<https://www.ricehouse.it/about-us>

<http://isobioproject.com/>

https://www.european-parliament-design-competition.eu/projects_european-parliament-design-competition_home.htm