INDUSTRIAL ECOLOGY CONCEPTS: AN OFFICE RENOVATION

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Office renovations aim not only to accomplish innovation and functionality, but ultimately strive to improve the performance, environmental behaviour, and overall well-being and health of workers.

The office original dates from 1995 and has an interior area of 100m2 and a terrace area of 57m2. Since the date of its construction, the office has not been through any process of renovation or modernization of its appliances.

Our vision for the office renovation is to apply Industrial Ecology concepts to an integrated, holistic design. Our concept is based on a systems thinking approach,

which combines management tools, operational needs and environmentally friendly design that encourage our organization to be sustainable and encourage our employees to have an ecological behavior.

The design approach integrates a total of two merits, as visualized in **Diagram 1** below. The holistic design aims to find **Integrated solutions** to social, environmental and technical needs with a circular, closed-

loop design that ambitions to achieve synergies between six main technical clusters: Energy, Water, Agriculture, Waste, Circular Economy and Transport. Each of these clusters is a source of inspiration for the design and a source for improvement of environmental and human well-being. The last merit, Integration of aesthetic and **functional aspects**, is embedded and it is intrinsic to the office renovation design.

Energy:

- Maximization of the use of natural light by creating an open floor plan
- Solar Panels as a source of renewable energy system
- Low consumption appliances, LED lights, Micro-moving sensors Water:
- Water-saving appliances: Dual flush toilets, greywater reuse
- Rainwater harvesting and water recirculation

Agriculture:

- Based on a vertical aquaponic system design
- Ecological food production with a diversity of crops
- Promote local production and consumption for our employees

Waste:

- Waste separation: Carton and paper; plastic and metals; organic; special waste
- Implementation of vermicomposting for fertilizer production

Circular economy:

Clusters

Merits

Synergy

- Sustainable and natural materials

- Modular and flexible design allows for easy disassembly of materials for future upcycling and reuse

Transport:

- The office has a strategic location that allows the use of public transportation.

- Design includes one shower to promote transportation through cycling

- Management: Time flexibility for employees and monetary incentives when the bicycle is used as a transportation system



Open floorplan: more natural daylight

Overall benefits of the office renovation:

- Improvement of **indoor** and **outdoor air quality**
- Reduction of the consumption of natural resources
- Reduction of **net emission**
- Improvement of **design aestnetics**
- Improvement of **human well-being**
- Reduction of the **heat island effect**
- Local food production and consumption
- Encouragement of ecological behavior



DIAGRAM 1.



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Section: connection to the garden



Diagram 2 illustrates the closed-loop design around the aquaponic system. Here the synergies between water, energy, agriculture and waste can be visualized: Rainwater is used for irrigation purposes, solar energy is harnessed as energy source for the water pumps used in the irrigation system and the organic waste is treated by a vermicomposting system which then provides fertilizers back to the system.



Bird's eye view of the garden



Aquaponic setup, waste storage, lunch table and outdoor kitchen