The world's first energy-positive residential tower

PROJECT:
Multifamily residential building

COMPANY:
Groupe Elithis + Credit Agricole Alsace-Vosges + Caisse des Dépôts (Banque des Territoires)

LOCATION:
Strasbourg, France

Challenge

Elithis' mission is to respond to today's major ecological and societal issues by:

- **Fighting** climate change, global warming and targeting carbon neutrality.
- **Innovating** to reduce energy consumption and carbon emissions; through digital smart apps, specifically designed systems and by generating its own electricity.
- **Lifting** households' purchasing power; the average energy bill in the Elithis building is 20x less than the French average, raising the tenants' budget thanks to the PV resale and additional rebate schemes.
- **Improving** health and wellbeing; all units are heated above the French norm, are spacious, bright, naturally ventilated, and comfortable without compromising the energy bill.
- **Limiting** urban spawl by optimizing land use.
- **Accelerating** the energy transition and developing digital services to enhance comfort and improve quality of life.

Solution / Approach

In 2018, after launching a successful architecture competition, Elithis completed the world's first energy-positive residential building in Strasbourg, enhancing the original office-concept model built ten years earlier in the city of Dijon.

The 17-story, 63 apartment tower and shared community rooftop area embodies the New European Bauhaus philosophy by demonstrating how living spaces can be more beautiful, inclusive, and sustainable all while remaining affordable. Through its 3-year operation, it has proved that zero-energy bills together with a neutral carbon footprint can be achieved on a large-scale residential building.

Science behind design

The Elithis Danube tower is a stylish energy-positive building that generates more energy than its residents consume and the building


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itself requires to operate, thanks to its low-tech approach, solar BIPV technology, smart home systems and its unique bioclimatic design.

Situated amidst water, green areas, parks, and cycle paths in the environmentally friendly eco-neighbourhood Danube, Strasbourg's former harbour district, the ultramodern and ultra-sustainable tower is truly an energy efficient and low-carbon building that doesn't compromise on design, comfort, or sustainability.

This elegant building is more than just a living space where users are truly considered for what they need.

Targets

After a 3-year period building operation, we have analyzed:

- The Elithis Danube building consumes in average 92 kWh/m2/year in primary energy and generates 99 kWh/m2/year of renewable solar energy giving it an **energy-positive balance.**
- The building produces 108% of its annual energy needs through 1 233m2 of PV panels installed on both rooftops and façades (east and south) generating an estimated 167 MWh/year. The electricity resale income is passed on to the tenants.
- The Elithis Danube building consumes in average 3.5kgCO2/m2.year, which is 18x less compared to French average existing housing stock (63kgCO2/m2.year) making the building save over 250 tons of CO2 per year.
- 30% of material resources were saved for the construction of the building compared to a standard new build.
- Additional budget of 1400€ average per year and per household who have a zero or almost zero energy bill. Average energy bill is 20x less than the French average.

Story

Elithis has created the world's first 'energy-positive' residential building of scale, which **produces more energy than it consumes.**

The solar panels on the building's roof and façades, combined with its state-of-the-art bioclimatic design, means energy output is maximized and leakage minimized through the seasons.

The electricity generated on-site is then sold to the public electric grid and the profits distributed to the tenants. The result: affordable rents and electricity & heating bills near zero.

Compact and optimized to limit warmth losses in wintertime and primarily facing the south to harvest solar energy, this self-sufficient and affordable living tower is sustainable and communal. In harmony with the environment and positively contributing to the wellbeing and economic circumstances of its residents and the community, it also provides all the modern comforts of 21st Century living.

The building's concrete structure provides a particular heat thermal capacity while its envelope is fully insulated with a high sealing level.

Also installed are high performant windows which help provide uniform temperature in all spaces, along with hybrid ventilation, large windows and floor-to-ceiling sliding doors adding natural daylight and boosting wellness; Heat recovery systems, heat units for instant hot water, different flooring systems allowing total flexibility within the space and easier mechanical distribution, panoramic elevators allowing natural light inside halls, and LED motion sensor lighting all help achieve additional energy savings.

> In our future projects we will always have the same intention which is doing good for the environment and preserve the environment.
>
> Alan KIRSCH, Head of Business Development of Elithis

All apartment units are spacious, well ventilated, comfortable, and bright. Residents are made well-aware of the role they can play to fight climate change through the **Elithis 'Smart Home App'** to which they are connected. It enables them to keep an overview on everything 'energy' going on in their house, from their energy consumption to a full home automation system, allowing them to control their temperature, lighting, energy use and shutters while a digital energy coach encourages sustainable home management and responsible environmental behaviour.

This App drives behavioural change by giving residents real-time feedback on their eco-gestures and the effect it has on their annual energy bill. Elithis rewards proactive eco-engagement by residents with an annual bonus, which they are encouraged to spend in the local community to support neighbouring businesses, driving a circular economy.

The human element plays a key role by having residents generate a sense of belonging and meaningful community which is enhanced by the communal meeting space built into the design. This area where community networking happens, is located at the highest floor providing a panoramic view over the beautiful city of Strasbourg.

The Elithis tower was built with a similar cost to a conventional residential building going against the prejudice that building sustainably is more expensive.

In 2019, Elithis partnered and formed an exclusive supply project pipeline with Catella, a pioneer on impact investing strategies, and set out a plan to deliver a €2 billion investment program to build **100-energy-positive residential towers across Europe by 2030.**

This partnership demonstrates Catella's commitment to invest in projects which will tackle climate change and social inequality, two of the greatest challenges of our time.

Elithis and Catella have created a world first in sustainable construction engineering design that truly integrates the 'environmental' with 'societal,' the 'E' with the 'S' in ESG.

Groupe Elithis
Elithis is a French building engineering consulting and real estate developer. A pioneer in low-carbon and energy-positive buildings, Elithis ranks among the leading players in the fields of building engineering, sustainability, and energy and environmental efficiency.

The group has a long-track record in supporting construction companies and real estate developers with sustainable and innovative smart solutions bringing a holistic approach and guaranteeing increased energy savings on their real estate projects

> The building is a two-edged sword. It does what it has to deliver and that at market price.
>
> Xavier JONGEN, Managing Director of Catella Residential Investment Management GmbH


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