



European Nearly Zero Energy Buildings Conference
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Summary

SOPHARMA AND LITEX TOWERS

Hi-tech intelligent building where light, architecture and sustainability meet business

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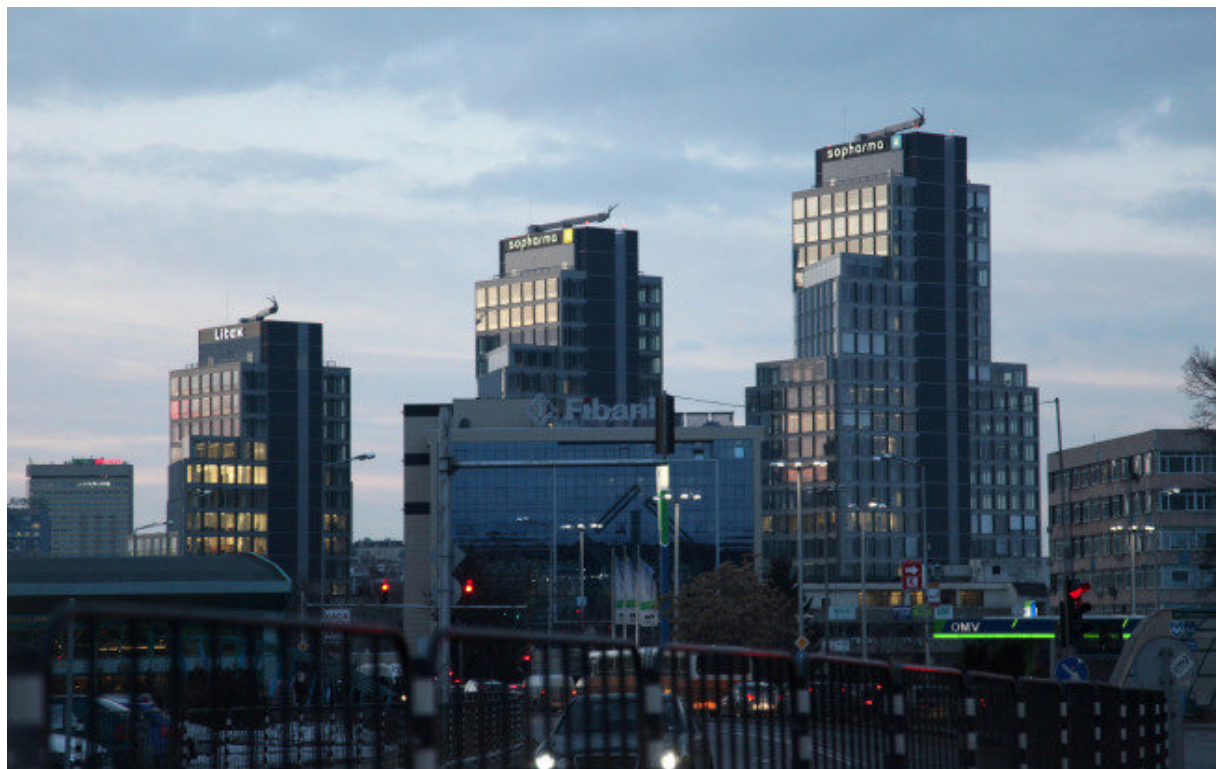
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Sopharma Towers

Total build area: 50 977 m²
Office space: 24 440 m²
Retail space: 9 813 m²
Underground build area: 16 724 m²

Litex Tower

Total build area: 16 097 m²
Office space: 9 949 m²
Retail space: 1 600 m²
Underground build area: 7 614 m²

The Sopharma and Litex Towers project started in 2006 while energy efficiency was still novelty in Bulgaria. The investors have interested in a building that was different from the available on the real estate market at the time and they took the risk to invest in innovative architecture.

When the towers were built they were the first “green” buildings to comply with the most demanding standards for energy efficiency. Moreover the buildings were the most environmentally friendly buildings offering unprecedented living comfort. Essentially the “towers” were the benchmark for all of the next construction projects in this category and as such changed the status quo.

Designed and built with the future in mind the towers incorporate modern best practices in architecture and construction. The buildings meet and in most cases exceed the highest standards for energy efficiency and working environment comfort levels.

The Sopharma and Litex Towers revolutionized the understanding and the application of sustainable energy efficient building technologies in Bulgaria.



Following innovations have been implemented in the project with measures to optimize the energy efficiency and comfort:

- ✓ Synergy between structure and systems
- ✓ First in class flexible and adaptive façade
- ✓ Active daylight to all parts of the interior. Applying solar architecture principles
- ✓ De-centralized HVAC system but synchronized with the façade modules and the BMS
- ✓ Intelligent BMS that guarantees maximum living comfort and energy efficiency
- ✓ Using concrete as thermal mass
- ✓ Using night ventilation for cooling in the summer
- ✓ Innovative construction concept
- ✓ The biggest green roof in Bulgaria

Key concept for the project:

Daylight and solar energy is fundamental for sustainable and energy-efficient architecture. The façade is a key component in achieving better results and it must be adaptive to the needs of the building. The façade provides the best possible transfer of energy and light to the interior.

Six main scenarios of behavior subject to external conditions are defined and deployed with flexibility that actively contributes in the energy management process.

- During warm seasons with strong sun there is high thermal load to the interior. Using retro-optical sun protection systems the façade minimizes the thermal load providing comfortable interior and savings from cooling power.
- During cold seasons the excellent thermal insulation properties of the façade and the use of solar energy lead to savings in heating power.
- During the cloudy days the façade provides maximum daylight deep into the office interior.
- During the winter night the blinds are closed, preserving the inner heat.
- The façade could be used for 3D mapping or other projections.

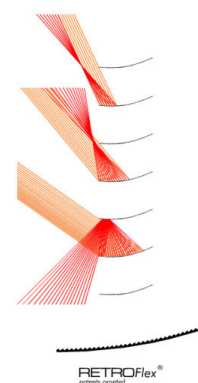
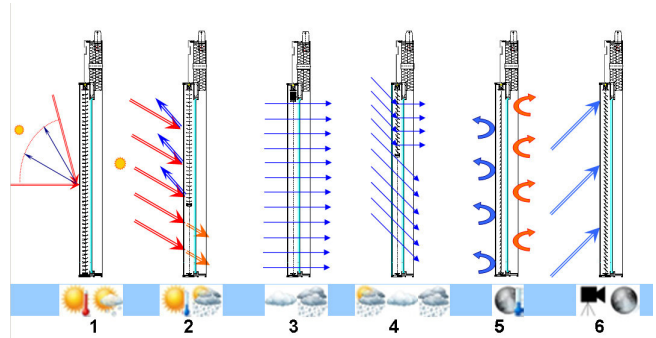
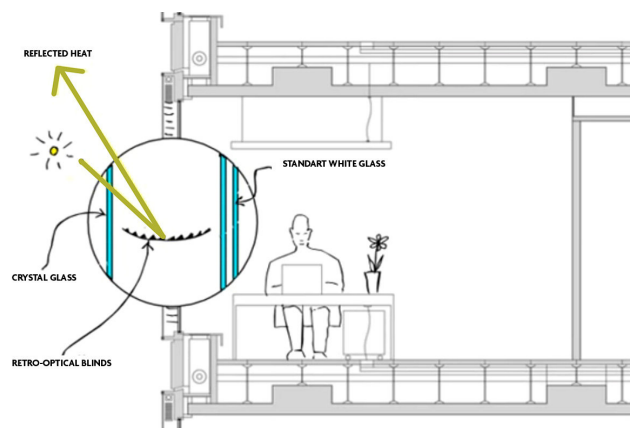
The glazed surface of the façade is 76% visible from outside and virtually 100% from inside.

A new generation retro-optical blinds reflect the sun energy back to the atmosphere, transmitting into the building only soft transfused daylight.

These blinds are incorporated in a thin double skin breathing element façade.

Managed by the BMS with intelligent algorithms, the façade turns into an active regulator of the interior micro-climate.

The interaction with the BMS provides flexible behavior of the façade according to the external conditions and interior needs. Energy is transmitted as much as it is required.

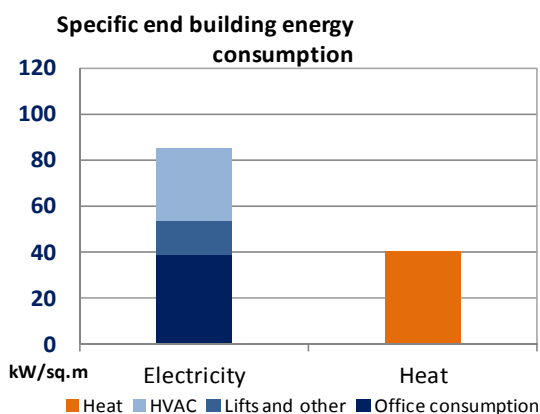
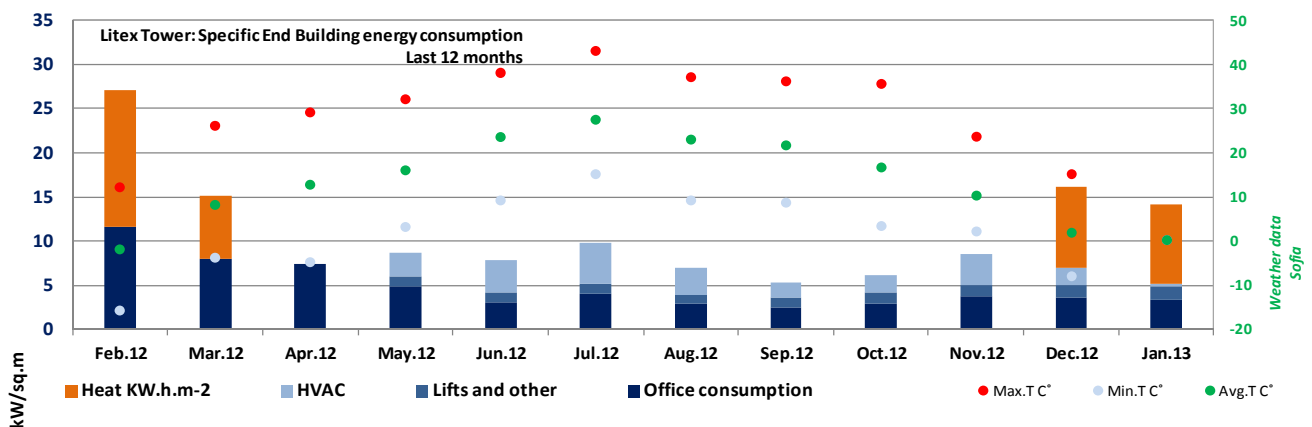


The façade is turned into one real adaptive system supporting huge flexibility and effectively contributing to the HVAC system.



Energy consumption results for the first 12 months.

Litex Tower: chart with the last 12 months end building energy consumption.



END BUILDING ENERGY CONSUMPTION PER SQUARE METER OFFICE AREA

- 40.7 kWh/m²a: Heating
- 31.6 kWh/m²a: Electricity HVAC (all systems)
- 14.4 kWh/m²a: Lifts & all others in the core.
- 39.2 kWh/m²a: Lighting & Computers/ all in the offices

The monitoring is ongoing process and next 2 years will continue.

Conclusions:

The experience from this project proved that the employed technologies combined with renewable energy sources will be right approach to achieve Zero Energy Building standards for office buildings.

References:

1. www.litextower.com – Litex Tower web page.
2. www.business towers.bg – Sopharma Business Towers web page.
3. www.architectonika.com – Arhitektonika Ltd.
4. www.kvelkovsky.eu – K. Velkovsky web page.
5. www.koester-lichtplanung.de – Koester Lichtplanung web page.

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Sofia,
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