SOPHARMA BUSINESS TOWERS – LITEX TOWER COMPLEX

INNOVATIONS AND ENERGY EFFICIANCY AT BUSINESS-CLASS BUILDINGS

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One project where the solar architecture and sustainability meet the business-class!

Sopharma Business Towers

Total build-up area: 50 977 square meters

Build-up area above ground: 34 253 square meters

Office space: 24 440 square meters

Retail space: 9 813 square meters

Underground build-up area: 16 724 square meters

Underground parking: 440 spaces

Underground warehouses: 1093 square meters

Parking on site: 32 spaces

Litex Tower

Total build-up area: 14 208 square meters

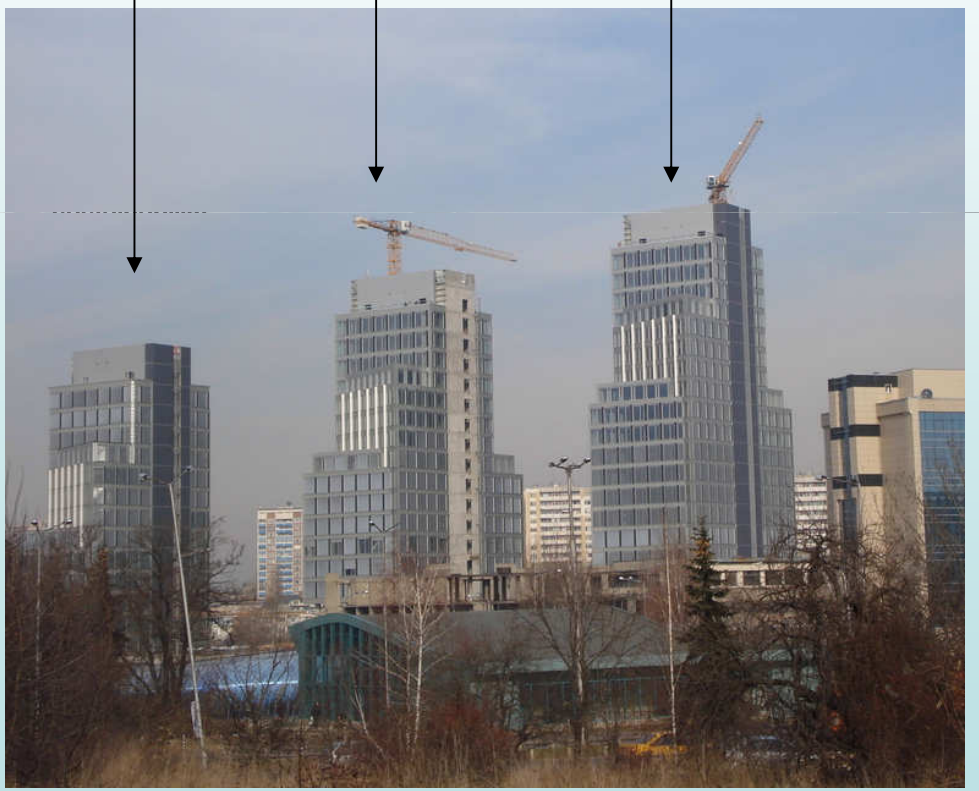
Office space: 7 000 square meters

Retail space: 1 600 square meters

Warehouses: 500 square meters

Underground parking: 100 spaces

Parking on site: 20 spaces



Ecological revolution at business class buildings.

The innovations executed at the project present deep vision in the future:

- ✓**Synergy – the art of the design integrate synergetic effect between the systems and the construction.**
- ✓**Unprecedented world-wide façade concept, flexible and adaptive.**
- ✓**Active day-lighting deep in the interior. Practical realization of the principals of the solar architecture.**
- ✓**Non-centralized HVAC system synchronized with the façade concept and the other systems.**
- ✓**Flexible building management system which guarantee optimal interior conditions along minimal energy consumption.**
- ✓**Optional, to be used concrete core mass in the cycles of the HVAC.**
- ✓**Optional, to be used night ventilation.**
- ✓**Innovative construction concept.**
- ✓**The biggest green roof in Bulgaria.**

The understanding of the modern and sustainable development in architecture requires application of concepts based on passive and in a harmony with the nature technologies to ensure high comfort, effective performance and luxury based on natural and renewable energy.

The complex Sopharma Business Towers - Litex Tower is a revolutionary change in the understanding, design and implementation of sustainable and energy-efficient technologies in business-class buildings for Bulgaria and even the world.

Designed and implemented with a vision in the future, the complex is a fully in line with modern standards and current perceptions of comfort and energy efficiency. It meets the most exacting international requirements and standards. In many directions, it even introduced new dimensions in the concept of energy efficiency especially for business-class buildings.

The project is the first in Bulgaria, where synergy effect in design and development of various components and systems, and their mutual commitment and synchronization have been looked for and implemented.

Concept for active usage of the daylight and solar energy

Adaptive facade concept

The façade concept is active part in normalization of the heat and solar radiation streams between exterior and interior.

It actively regulates the energy streams and participate in the acclimatization processes and protection of the interior micro-climate.

Winter time

Optimized thermal protection and effective usage of solar energy.

Reduced heating consumption

Active usage of daylight in dept into the interior – reduced consumption of energy

Summer Time

Optimized solar protection and overheating protection

Reduced cooling power consumption

Active usage of daylight in depth – reduced energy consumption from lighting and cooling

Effective energy savings from Heating, Cooling, Ventilation and interior lighting. Better comfort and healthy environment, used natural lighting sources.

Reduced maintenance fees in building live cycle

Effective reduction of CO2 emissions.

A fundamental starting point in the spot of sustainable and energy-efficient architecture is the concept of active use of daylight and utilization of the solar energy.

To achieve practically high performance, the facade concept is a key moment and necessary to be flexible and adapt as conditions to the needs of the building like human skin do it.

Adaptive facade concept is based on the principle effectively to provide the best possible conditions of energy, heat and light transmission to the needs of the interior according to exterior conditions. Briefly, it can be illustrated as following:

- During the warm seasons with strong sun which suggest high thermal load in the interior the conceptual decision to use retro-optical sun protection systems minimize the load to low values and effectively realize savings from cooling power, while ensuring a comfortable interior.

- During the cold seasons optimized, and excellent thermal insulation properties combined with the ability to use the available solar energy effectively leads to savings in heating power.

A possibility soft diffused light to be used deeply in the interior during all seasons leads to impressive savings from interior lighting, and for the warm seasons additional savings by cooling power.

As a result of the adaptive facade concept all factors of influence in a combination lead to an effective high-energy efficiency achieved in the following sectors:

- Heating.

- Cooling and ventilation.

- Internal lighting.

Other benefits are for the public, social and economic aspects as a result of effective savings in CO2 emissions in a large-scale.

The possibility natural light sources and energy to be used to ensure a high comfort and healthy environment for one excellent price - natural resource to be used.

Adaptive façade concept – energy parameters:

Heat transmission parameters:

Total heat conduction factor Uw (general for the façade):	1.15 W/(m².K). Nominal value.
With activated and closed shading devices:	Fall below the nominal value
With active shading devices and direct sun onto façade:	Could be made 0 depending on the external conditions.

Solar protection parameters: Retro-Optical blinds with active guiding system by BMS.

Maximal solar factor no-shading devices:	56% (glass nominal)
Minimal solar factor with shading devices (closed):	less than 6%
Nominal solar factor summer time* (operative):	11% (9% - 13%)
Nominal solar factor winter time* (operative):	Up to 35% ÷ 40%

* In terms of active use of daylight deeply into the interior.

Dynamic energy range which can be guided by automation	From 56% to less than 6%

Light transmission properties:

Light transmission of the pure glass construction (no blinds):	71%
Diffuse light transmission with blinds in horizontal position:	25% – 30%
With active blinds automation:	25% – 5%

The complex of buildings is a concept with an extremely high glazed surface on the facades: 76% on a visual look from outside and virtually 100% from inside.

In such high percentage of glazed facade concept the solar energetic parameters and adaptability of the system are the key aspects for successful implementation of sustainable and energy-efficient design.

The preferred facade concept in this case is a thin layer double glazed elements with integrated retro-optical sun-protection systems build in.

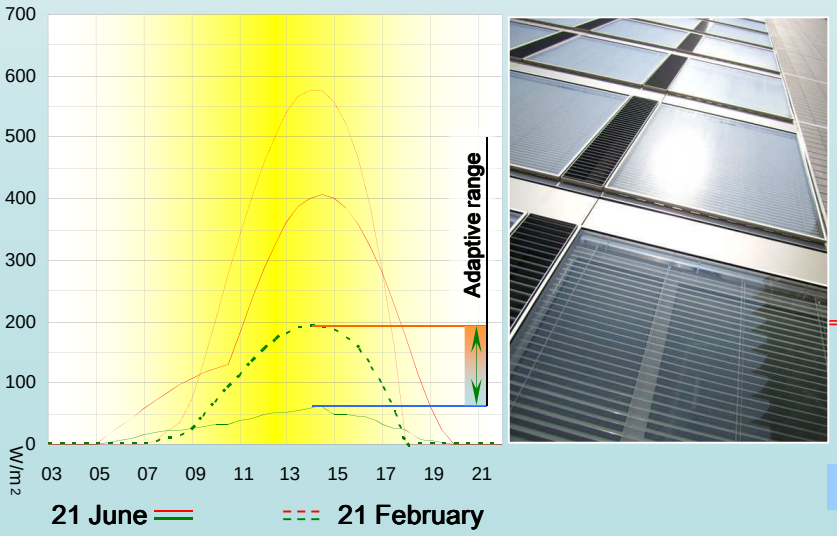
Managed by the building automation system with intelligent algorithms, the facade turns into an active regulator and actor in the maintenance of the interior micro-climate.

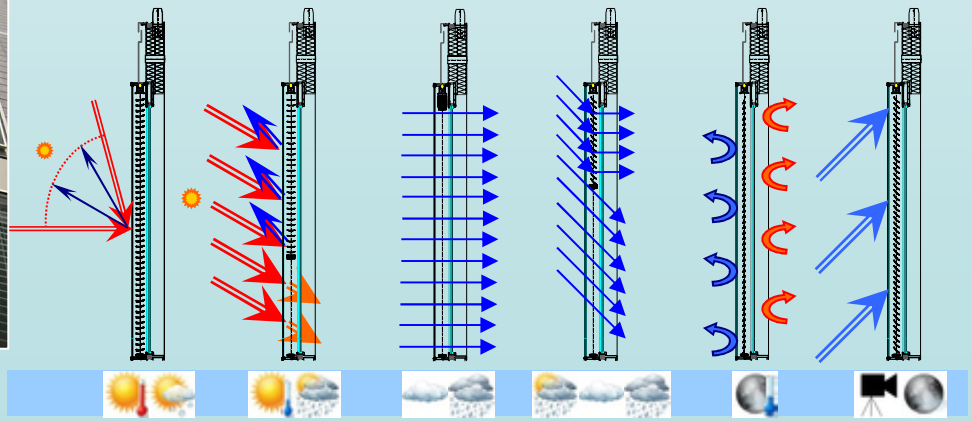
Conceptually, the buildings have a flexible solution that reacts to energy flows according to the conditions and needs of the buildings like a human skin.

The question how much energy is transmitted, since the facade is adaptive and will react in different ways within the intended flexibility no more exist. As much as the needs are - is the correct answer.

The interaction with the BMS provides flexible behavior of the facade according to the external conditions and interior need.

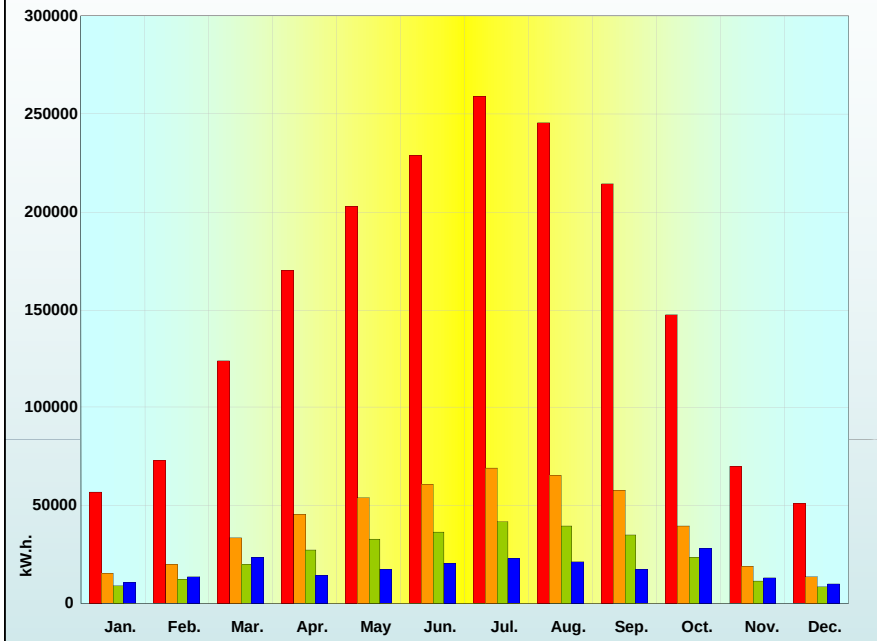
Five main scenarios of behavior subject to external conditions are basically defined and can be mixed depending on the needs and the targets which flexibility actively contributes in the energy management process.





Sectors where savings are achieved

Heating, Cooling and Ventilation.



Energy balance based on Solar radiation per months.

Total received energy from the building

Transmitted into the interior energy from traditional concept g: 0.50 with interior blinds.

Transmitted into the interior energy from modern concept g: 0.30 with interior blinds.

Adaptive façade concept g: 0.11 – 0.35 thin double skin with retro-optics.

How does the facade concept influence on the total energy consumption?

The ability to redirect the energy and to use solar energy, combined with the use of daylight in the deep interior, realize substantial savings of energy.

One direction for realizing substantial savings shares are: heating, ventilation and cooling.

During cold seasons, very good thermal insulation performance in combination with the ability to effectively be raised to pass the solar realize immediate profits in terms of comfort reserved.

During the warm seasons, minimizing the impact of direct solar energy significantly reduces the heat load and realizes immediate savings in cooling capacity.

The charts compare the total received energy and loads in the months and seasons for the following types of facade concepts:

(Orange) Traditional facade with interior sun-protection

(Green) Modern facade concept with interior sun-protection

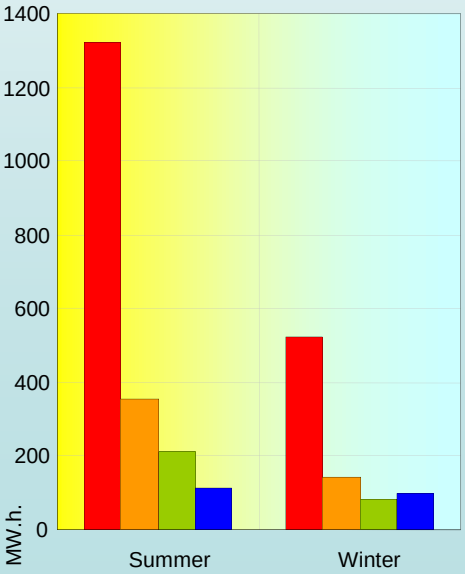
(Blue) Adaptive facade concept

Remarkable is that:

- In warm seasons the adaptive concept leads to be approximately twice smaller loads for the interior.

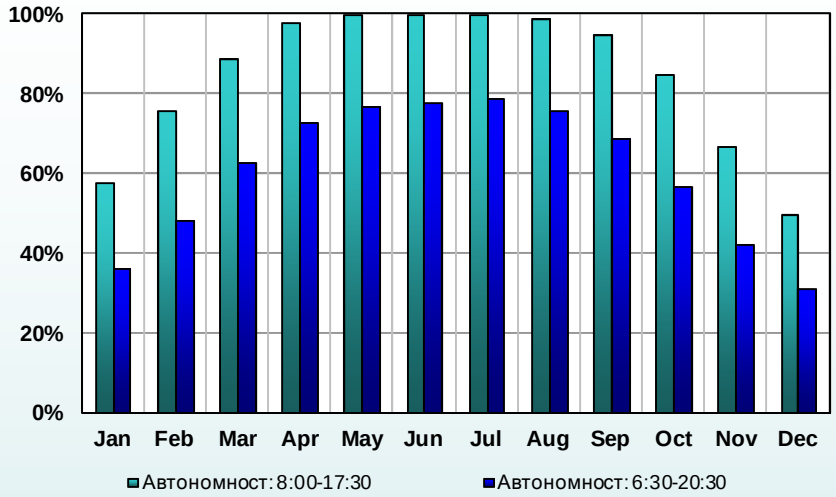
- In cold seasons the adaptive concept or equaling or slightly superior to the modern used concepts and allow more energy as plus for the interior.

Adaptive facade concept:



- **Winter time – increase the solar transmission factor and effective usage of the solar energy, leads to direct savings form heating power – Heating sector savings.**
- **Summer time – minimize the affect of the direct solar energy and effective reduce the demand of cooling power, leads to direct savings in Cooling and Ventilation sectors.**

Sectors where are achieved savings



Another key to achieve a huge amount of energy savings is the active usage of soft diffuse daylight deeply into the interior during daylight hours.

Unique asset of the facade design is very high light transmittance and transparency of the combination used glasses and sunscreen.

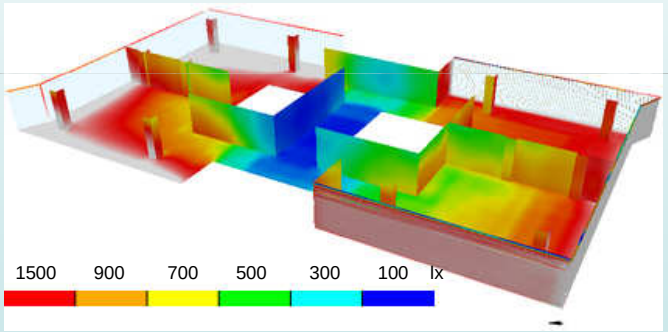
It is a guarantee that an enviable autonomy of the interior with regard to the option natural daylight to be used actively.

On the other hand, that provides an enviable comfort, a sense of luxury and health of the environment.

Underlying assumptions and analysis indicate about 85% of normal working hours in the annual plan the main office of the buildings will not need the usage of interior lighting.

The high percentage of autonomy influence towards minimizing energy consumption in summer cooling and ventilation units by eliminating the effect for interior further heat load from the use of lighters, especially in times of direct sunlight (flush effect direct sunlight, closed blinds, lighted lamps - as a consequence).

Autonomy of the building to use daylight deep into the interior per months



Remarkable savings are achieved through the usage of daylight deeply in the interior as well as better confront.

Minimum illumination as per the standard: **500 Lux**

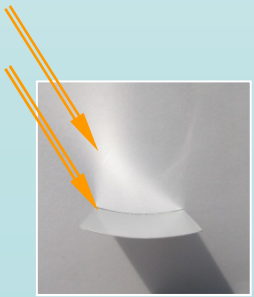
Minimum exterior illumination: **bellow 10000 Lux**

Daylight factor: **5%**

Autonomy of the building yearly based for operative plans (working time):

8:00 – 17:00 **85% from the working time**

6:30 – 20:30 **61% from the working time**



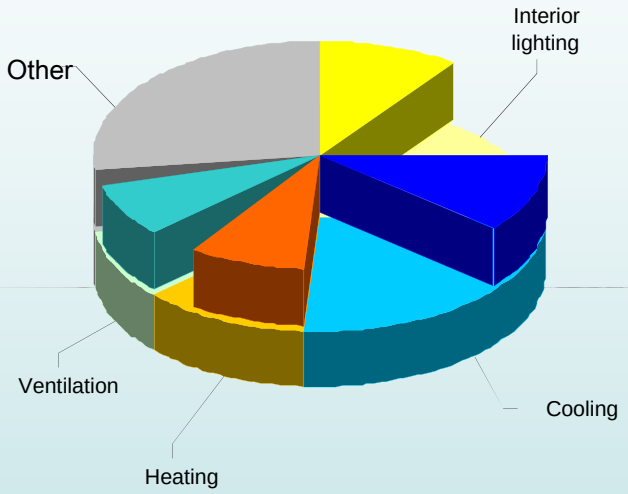
Synergy in action - estimated savings and innovation as directions :

- Interior lighting

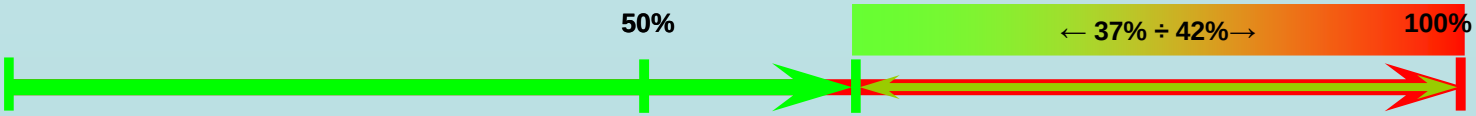
- Cooling

- Heating

- Ventilation



Energy consumption % sectors from total	Averaged EU distribution	Day-lighting & adaptive façade concept
Interior lighting	**25.0%**	**10.0%**
Cooling	**26.0%**	**11.2%**
Heating	**12.0%**	**8.0%**
Ventilation	**10.0%**	**7.0%**
Other to 100% (constant)	**27.0%**	**-37%**



LITEX TOWER

KÖSTER LICHTPLANUNG

Kiril Velkovsky

Architectonika Studio Ltd

RETRO SOLAR Gesellschaft für Tageslichtsysteme mbH

REYNAERS aluminium

KRISTIAN NEIKO

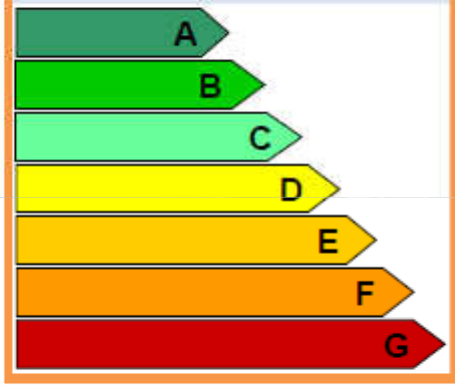
Litex Tower Energy Passport

ЕНЕРГИЕН ПАСПОРТ

Сграда	Административна сграда с подземни гаражи, помещение за трафопост, магазин за хранителни стоки, фризьорски и козметичен център, кафе, офис /туристическа агенция/, ресторант
Адрес	УПИ III от кв. 2 по плана на гр. София, м. Дианабад, р-н "Изгрев" СО

Регистрационен номер		
Разгъната застроена площ	16097	m²
Отоплявана площ	9949	m²
Площ на охлаждания обем	9949	m²

Скала на класовете на енергопотребление



	По потребна енергия	По първична енергия
	B	B

ПРОЕКТНИ ЕНЕРГИЙНИ ХАРАКТЕРИСТИКИ	Потребна енергия: референт-на стойност	Потребна енергия: проектна нетна енергия при отсъствие на вътрешни товари	Потребна енергия: проектна брутна енергия с отчитане на вътрешни товари	Първична енергия: с отчитане на вътрешни товари	Първична енергия: емисии CO_2
Специфичен годишен разход на енергия	67,6 kWh/m²	57,8 kWh/m²	69,4 kWh/m²	266,9 kWh/m²	1613 т/год.
Общ годишен разход на енергия	1 345 MWh	1 149 MWh	1 379 MWh	2 654 MWh	
Енергия от възобновяеми енергийни източници, MWh/год.				няма	Дял на ВЕИ %

Съставен на 12.09.2011г.

Съставен от „Нормис" ЕООД

	Heat insulation norms up to 1987 y.		Heat insulation norms after 1999 y.	
	kWh/m²	W/m²	kWh/m²	W/m²
Residential – 5 floors				
1. Heating	50.3	50.0	45.3	45.0
2. Ventilation	24.0	24.0	24.0	24.0
3. BVG	57.1	7.0	55.6	7.0
4. Fans&pumps	5.3	1.0	5.3	1.0
Total:	**136.7**		**130.2**	
Litex compare to:	**-57.0%**		**-54.8%**	
Residential – 14 floors				
1. Heating	44.3	42.0	40.4	39.0
2. Ventilation	30.0	31.0	30.0	31.0
3. BVG	51.1	7.0	49.6	7.0
4. Fans&pumps	6.3	1.0	6.3	1.0
Total:	**131.7**		**126.3**	
Litex compare to:	**-55.4%**		**-53.4%**	
Schools				
1. Heating	69.6	70.0	50.1	57.0
2. Ventilation	9.2	21.0	9.2	21.0
3. BVG	18.5	10.0	18.5	10.0
4. Fans&pumps	3.4	1.0	3.4	1.0
Total:	**100.7**		**81.2**	
Litex compare to:	**-41.6%**		**-27.6%**	
Universities/Collages				
1. Heating	68.3	64.0	56.5	54.0
2. Ventilation	1.4	3.0	9.5	13.0
3. BVG	13.8	9.0	13.8	9.0
4. Fans&pumps	2.7	1.0	5.3	1.0
Total:	**86.2**		**85.1**	
Litex compare to:	**-31.8%**		**-30.9%**	
Administrative buildings				
1. Heating	87.4	63.0	62.1	49.0
2. Ventilation	2.1	5.0	2.1	5.0
3. BVG	1.8	6.0	1.8	6.0
4. Fans&pumps	1.7	1.0	1.7	1.0
Total:	**93.0**		**67.7**	
Litex compare to:	**-36.8%**		**-13.1%**	
Litex Tower				
			20.5	
			21.5	
			3.6	
			13.2	
			58.8	

Total area	**16097 m²**
Heating area	**9949 m²**
Cooling Area	**9949 m²**

	End energy	Primary Energy
Energy class:	**B**	**B**

Design Energy Properties	Energy need: Referent values	Energy need: With no internal load	Energy need: With internal load	Primary energy: With internal load	Primary energy: CO2 emissions
Specific yearly consumption	**67.6 kWh/m²**	**57.8 kWh/m²**	**69.4 kWh/m²**	**266.9 kWh/m²**	**1613 t/anno**
General yearly consumption	**1345 kWh/m²**	**1149 kWh/m²**	**1379 kWh/m²**	**2654 kWh/m²**	

January 2012 Sopharma-Litex Business Towers

One project where the solar architecture and sustainability meet the business-class.

Award “Building of the year" 2011

- Public buildings with business functions

- Green buildings

VIP PROPERTY AWARDS 2011

First prize

New Business Ideas Awards 2011 on 7 Dec 2011:

New Building First Prize - Sopharma Business Tower and Litex Tower

Dip. Ing. M.Sc. Kiril Velkovsky

www.kvelkovsky.eu

Golden DGNB Certificate for sustainable construction.