

“The Miracle of the Oil” – Energy and Environment Preserving Architecture

Gil Peled, Architect

Half of the world’s energy consumption is used for the construction, operation and demolition of buildings, hence the significance of energy and environment preserving architecture for the saving of global natural resources. In its modern form, energy and environment preserving architecture resulted from the energy crisis of the 1970’s. It was then understood that energy resources are limited, and their availability and equal distribution are no longer guaranteed. Individual architects and activists understood this situation constructing dozens of buildings taking into account principles of energy and environmental preservation, yet the general public and the establishment viewed these individuals more as ‘freaks’. Looking back, they were the pioneers laying the foundation for sustainable architecture.

During the 70s and 80s such activities were also taking place in Israel and included architects, mostly working in Jerusalem and the south of the country: the Unit for Desert Architecture in Sede Boker, the Building Research Institute and Faculty of Architecture at the Technion in Haifa, as well as the Ministry for Infrastructure. Lahav Rigg Architects is one of the few private practices which continues from that period to design energy and environment preserving buildings. The firm’s key projects include the Hegedosh House at Ir Ganim, the Nofim Residential Tower for the elderly at Kiryat Yovel, the Luz factory building in Har Hotzvim, and the Ilan Ramon Primary School – all in Jerusalem, and the government administrative complex in Beer Sheba. Each of these projects is a pioneer

in energy-conserving architecture in Israel. This exhibition provides an opportunity to examine their key characteristics.

Consideration of site and climate – most buildings are placed so that the main functions face southwards, allowing maximal use of solar heat and natural light, with consideration to the on-site wind profile as well as shadowing during the various seasons. The design also takes into account the surrounding structures, to prevent mutual overshadowing and wind turbulence. The government ministries complex in Beer Sheba and the Ilan Ramon School in Jerusalem include internal courtyards, creating pleasant micro-climates. In the Hegedosh residence and the Nofim Tower in Jerusalem, solar porches, trombe walls and heat storage have been incorporated into the design. Portal sizes and directions have been designed to maximize natural light and to create year round thermal comfort. All this had been achieved with simple architectural means and with no mechanical systems.

Scale, internal and external views – most of the buildings are terraced with a division of the building mass. The government ministries complex in Beer Sheba is divided into several sections with a connective axis. The entrance hall is generously high, allowing wide views of the interior as well as of the city beyond. The Nofim Tower was planned so as not to disrupt the views to Ein Kerem, and has been scaled so that it seems lower than it actually is compared to the surrounding towers. The Ilan Ramon School includes bay windows in the corridors, creating direct visual contact with the internal courtyards where student activities take place. All these create a pleasant atmosphere with additional interest and functional value.

Teamwork and design integration – over the years the Lahav-Rigg practice has included associate architects, and partners from abroad Tony Rigg and Prof. Len Warsaw, and has worked jointly with leading experts such as Prof. Baruch Givoni, Eng. Amos Halfon and others. The projects' design process includes the client and a multi-disciplinary team of advisors. The ability to coordinate this process brings about the integration of computation and imaging, the planning and the architectural design. This is visible in the Beer Sheba complex where the portals' size and direction are determined according to the amount of light required, and the distances between the pillars in the parking area which were determined the sizes of the courtyards and were planned in accordance to the light requirements and penetration. A further example is the Nofim Tower, where accurate passive solar design led to 70% of the apartments including a sun-porch.

Materials, color, form – Particularly in Jerusalem the ability to combine material, color and form stands out. The Luz Factory building is one of the first structures in Israel to utilize curtain walls from stone and glass. The frames' red color emphasizes the geometry of the building, standing in an industrial zone, giving a faithful representation of the advanced technologies of the firm. The Nofim Tower is another example of accurate and proportional use of glass and color, while still being considered as a "Jerusalem"-type building. The Beer Sheba government complex employs a wealth of materials, shapes and colors representing the structures' different functions and the various directions they face. This difference is visible between the northern and southern facades, between the north curtain wall and the shadowed strip of windows facing south. All of these structures are characterized by sculptural

shapes, portrayed for example in the various roofs, presenting the overall design of the structures.

Functional combination and diversity – in the Beer Sheba government complex, the bottom floors include parking and a shopping mall as well as an avenue of shops and piazzas. Above them stand the various office sections separated by courtyards where natural light and sun enter from the outside. The entrance hall is also used to ventilate the building, leading to an efficient and optimal usage of the complex during most hours of the day. In the Nofim Tower, the porches collect the winter sun, turning them into an additional protected space for the residents. The internal courtyards in the Ilan Ramon School inject light into the building and also function as study spaces for external activities. The Luz Factory building's patio is a meeting area for the employees as well as a natural ventilation shaft.

All these buildings are a testimony that a local, resource-efficient, sustainable and financially beneficial architecture can be produced in Israel. On average, these buildings reduce energy consumption and CO2 emissions by 40%. Energy-conserving buildings have added benefits such as client satisfaction, healthier indoor environments with thermal comfort and more. Energy and environment preserving architecture is now a necessity, the wide-spread use of which can prove to be a modern-day "Miracle of the Oil".

The author is the director of Eco-Challenges – Sustainable Consulting and Planning, and coordinator of energy conservation and efficiency at the Israel Association of Renewable Energy Companies.