



Intel[®] Technology Journal

Technology with the Environment in Mind

Intel's First Designed and Built Green Building

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Index words: Green Building, sustainable construction, Intel's first, LEED, R&D building, energy, productivity, maintenance cost

ABSTRACT

The goal of the "Green Building" project is to reduce the impact of construction on the environment. By doing this Intel joins the world's efforts in sustainable construction. The Green Building project differs from conventional building projects by assigning equal priorities to economical, social, and environmental goals. The new Intel R&D building, located in Haifa, Israel, is designed per the Leadership in Energy & Environmental Design (LEED*) rating system. These were the objectives of the design process:

- To achieve energy and water savings.
- To incorporate environmental friendly materials into the building.
- To implement waste and recycling policies.
- To provide a high-quality internal environment.
- To position and plan the site to reduce the impact on the environment.

The new Intel R&D building is now under construction and is undergoing a certification process. Once awarded, it will become Intel's first certified Green Building worldwide!

This project was initiated to address the need for a "smart" building. The Green Building concept was found to be the most suitable for this purpose, particularly for an R&D building. Research shows that such a building improves tenants' satisfaction and health, enabling higher employee productivity; and it reduces energy and maintenance costs for the owners. The estimated ROI due to operational costs is approximately five years.

In this paper we show the innovation, logic, drivers, and triggers that helped us overcome significant challenges in dealing with an inexperienced local building industry, and in driving innovation in a large organization.

Our engagement with the local construction industry adds a new dimension to the concept of Intel social responsibility.

Our key message is that it is possible to execute a local and innovative initiative successfully, even in global corporations, once the initiative supports the corporate values.

INTRODUCTION

R&D Environment Need for "Smart Buildings"

Design Center building is an example of an ever changing construction environment in a leading corporation. The energy consumed by our existing R&D buildings has increased since 2003 from 2MW to 8MW. That's an increase of 400% in less than four years. Such growth requires many fast conversions of office spaces and energy infrastructure, while at the same time keeping the quality high and the cost low. There are no construction rules for this kind of turnaround; our business continuation policy requires creative engineering solutions to provide adequate power and space, within the same building structure, and without or with minimum interruption to the business. Innovative and creative solutions already resulted from our R&D operational challenges (i.e., installing an ice storage reservoir as an Uninterruptible Chilled Water Supply to a Data Center or water-cooled server racks to optimize Data Center space).

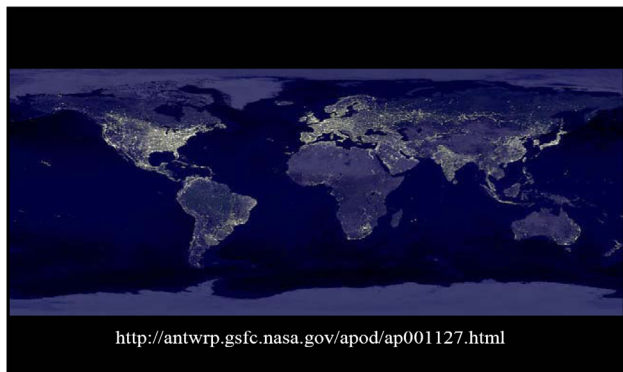
Back in 2004, Intel Corporation decided to build a new development center in Israel. At that time, the practical decision makers in the local construction industry were totally unaware of the concept of Green Buildings (although this concept was known to environmental groups and to a few in the academy). The public at large (excluding environmental groups) had as yet not been exposed much to this concept. In light of this fact, the decision to build and formally certify a first Green

Building, new to Intel Corporation and new to the local industry, is considered a breakthrough.

The experience gained by the local engineers helped establish the “Site Engineering Management Mission,” documented in the project scope: “...*New IDC Building will be built smartly, will be flexible to modifications and designed with energy savings in mind...*” (Marc Denner, 2004). This mission defined the scope for an efficient energy facility, with modular and low-cost conversions of offices and spaces, suitable as working environments for researchers, and with effective Total Cost of Ownership. Actually, this common strategy affected the project team’s mindset, thus broadening their goal: reduce the impact the building has on the environment, decrease the contribution to global warming, and create a healthier place to work. This “Sustainable Development” approach created a new standard for Intel R&D buildings.

Sustainable Development

The concept of environmental management and education for nature conservation has changed dramatically over the last few decades. A romantic approach was dominant in the early 60s, where conservation of the wild areas outside of the cities was considered to be the issue, and the public was encouraged to go out from the urban environment to nature. During the 70s a more apocalyptic approach was adopted, mainly due to the large number of environmental catastrophes reported during those years: In 1967, the Torrey Canyon oil tanker went aground off the southwest coast of England, and in 1969 oil spilled from an offshore well in California’s Santa Barbara Channel. In 1971, the ruling of a lawsuit in Japan drew international attention to the effects of decades of mercury poisoning on the people of Minamata, and later in 1978, in Love Canal, New York, the discovery of toxic waste buried beneath an entire neighborhood attracted the world’s attention.



<http://antwrrp.gsfc.nasa.gov/apod/ap001127.html>

Figure 1: Photo of Earth from space emphasizing the interrelation between development and ecology impacts

Meanwhile, photos of Earth from outer space emphasized the deleterious consequences of our technological

“progress,” and showed us how truly small a place the Earth is in the universe (see Figure 1) [1].

The 1980s saw a rise in public concern about the role of business in society following a series of notorious environmental and social incidents, and by the early 1990s, the Brundtland Report (1987) and the Earth Summit (Rio de Janeiro, 1992) had inspired a shift in the understanding of the concept of development. These landmark events pushed the idea of development beyond economic growth and the continued generation of wealth defined narrowly in financial terms, to include the concepts of intra- and inter-generational equity and quality of life [2].

The concept of “Sustainable Development” came into general usage following the publication of the 1987 report of the Brundtland Commission, the World Commission on Environment and Development (WCED). This commission coined what was to become the most often-quoted definition of Sustainable Development: development that “meets the needs of the present generation without compromising the ability of future generations to meet their own needs” [3].

Sustainable Development does not focus solely on environmental issues. More broadly, Sustainable Development policies encompass three general policy areas: economic, environmental, and social (Figure 2). Only at a point where all three areas merge, is real sustainable action taken [4].

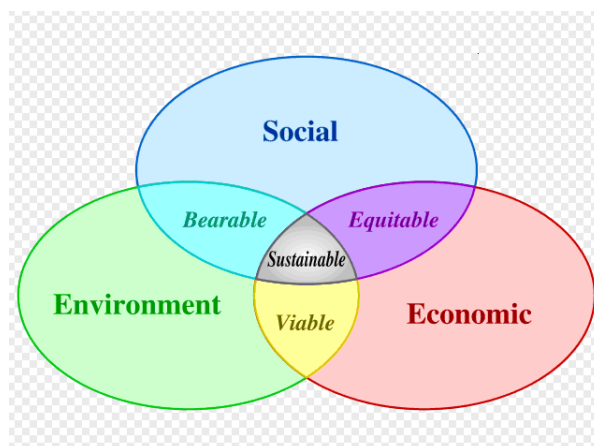


Figure 2: Scheme of Sustainable Development: the confluence of three policy areas

The World Business Council for Sustainable Development, founded in 1995, has formulated the business case for Sustainable Development and argues that “Sustainable Development is good for business and business is good for Sustainable Development” [5].

This concept of Sustainable Development spawned the emergence of the “triple bottom line” concept, which lies

at the heart of corporate responsibility and corporate citizenship. Central to this is the need to measure and report on a company's performance with respect to economic prosperity, social justice, and environmental quality.

The roles and responsibilities of business in society, in particular global businesses, are being defined more broadly. Stakeholder demands are increasingly going beyond the obligation to "do no harm" to the responsibility for being "a positive force" in contributing to worldwide social development goals [6].

Green Building and LEED Certification Benefits

The built environment has a profound impact on our natural environment, economy, health, and productivity [7]. In the United States alone, buildings account for

- 65% of electricity consumption
- 36% of energy use
- 30% of greenhouse gas emissions
- 30% of raw materials use
- 30% of waste output (136 million tons annually)
- 12% of potable water consumption

In Israel, buildings account for [8]

- 30% of the total of electricity consumption, 12% of which is for heating, cooling, and lighting
- 30% of the total energy consumption in the commercial sector, largely used for heating, cooling and lighting
- 7.5 million tons of building waste, generated every year
- 30% of the fresh water consumption

Building green, if it is done right, reduces the impact on the global environment, supports community improvement, increases the useful life of building systems and equipment, increases property values, and contributes to user satisfaction and productivity resulting in reduced absenteeism [9]. It also enhances the corporate profile, supports the local economy, and reduces the building life-cycle cost.

In order to promote environmentally-responsible building in Israel, the Israel Ministry of Environmental Protection published guidelines on the subject in 1997 [10]. The guidelines are based on the environmentally-responsible building guidelines prepared for New York City in 1996 by Dr. Miriam Haran and Professor Victor Goldsmith, on behalf of the Center for Applied Studies of the Environment of the City University of New York.

The guidelines deal with all stages of construction including the following:

- Project and program planning, including definition of the project and consideration of non-construction options, site selection, and building for the long term.
- Design processes including integrated design processes and decision-making models for evaluating trade-offs.
- Building energy use including life-cycle cost.
- Indoor environment.
- Material and product selection including life-cycle analysis.
- Water reduction/management use, storm water runoff, use of non-potable water and landscaping.
- Operation and maintenance considerations.
- Construction considerations including health and safety issues.

There is no characteristic look of a green building. While natural and resource-efficient features can be highlighted in a building, they can also be invisible within any architectural design aesthetics [11]. However, meeting the above guidelines, together with complying with a rating system, provides a relative measure of how "re" the building is. By applying a measurable standard and third-party audit, following these guidelines can ensure recognition and validation to the level of commitment. In recent years, there has been a proliferation of labels for building products said to be produced in an environmentally and socially responsible manner.

The term "eco-label" is any label, seal, or logo used to give purchasers, including architects, designers, and builders, an assurance that the environmental characteristics or production methods of the product used improve the performance of the building envelope [12]. Not all Green Buildings' eco-labels are the same, but most will cover these five broad areas: sustainable site planning, safeguarding water, energy efficiency, conservation of material and resources, and indoor air quality. LEED was chosen as the project's rating system.

LEED is a rating system developed by the U.S. Green Building Council (USGBC), and it is the most acceptable one in the U.S. LEED has four levels, each characterized by earned points: "Certified" (minimum 26 points), "Silver" (minimum 33 points), "Gold" (minimum 39 points) and "Platinum" (minimum 52 points). A level qualifies and quantifies a building's environmental and energy characteristics compared to known common standards and to other certified Green Buildings. This process encourages and accelerates global adoption of sustainable green building and development practices

through the creation and implementation of universally understood and accepted tools and performance criteria. This instrument is used to evaluate environmental performance from a “whole building” perspective over a building life-cycle, providing a definitive standard for what constitutes a green building. LEED for new construction rating system is designed to guide and distinguish high-performance commercial and institutional projects, including office buildings, high-rise residential buildings, government buildings, recreational facilities, manufacturing plants, and laboratories.

The USGBC has asserted that a LEED-Certified level or LEED-Silver level should not cost more than a conventional building [13]. Studies show that LEED buildings fall within the typical cost range of conventional similar building types. A comprehensive study, done by Gregory H. Katz [14], shows that the green cost premium for LEED Silver Certification level, averaged over 18 office and school projects, is around 2% (see Figure 3).

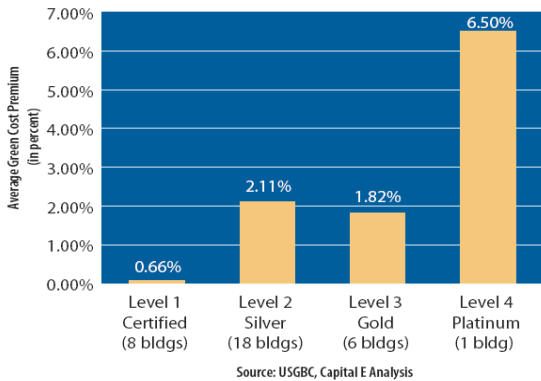


Figure 3: Average green cost premium vs. level of green certification for offices and schools

Davis Langdon [15] updated in 2006 his previous study and showed essentially the same results he published in 2004: there is no significant difference in average costs for green buildings as compared to non-green buildings. Many green buildings’ projects end with little or no added cost, and with budgets well within the cost range of non-green buildings with similar programs.

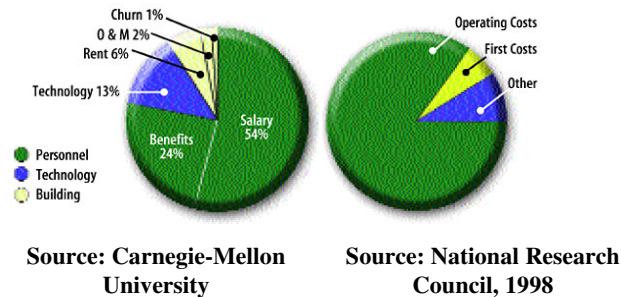


Figure 4: Personnel and operation costs contribution to building life-cycle costs

As important as they are, real costs are not the only costs to be considered. In many cases, opportunity costs hinge on how a building affects employees as they are by far the largest expense for most companies (Figure 4). Steven Morton from HOK [16] wrote that for offices, salaries are 72 times higher than energy costs, and they account for 92% of the life-cycle cost of a building. On average, Americans spend more than 90% of their time indoors, while case studies show that healthy indoor environments can increase employee productivity, due to less absenteeism, and can cause employees to stay in their jobs longer.

Israeli “Green” Construction Market Capabilities

Many revolutionary “green” developments and solutions carry the stamp of an Israeli company and are constantly being invented by Israeli scientists, developed by Israeli companies, and funded by local investors. Nonetheless, when it comes to implementing these high-technology environmental solutions, it seems that Israel lags behind the rest of the world [17]. Construction management and engineering firms still have limited experience with sustainable design and construction. Trade contractors have never used sustainable construction specifications or equipment and material delivery. Local material suppliers are still not aware of the developing green business opportunities in Israel. Only limited available “eco-labeled” construction materials are available to the local market. In many cases, vendors and suppliers do not know if their product carries a “sustainability” label, such as recyclable content data, and they lack the required supportive documentation.

Difficulties have been evaluated and were acknowledged during the project’s planning phase. As a result, the team assumed responsibility to share the experience gained in this project and pave the way for the local construction industry.

DRIVERS

Management Commitment to Social and Environmental Responsibility

Intel co-founder Gordon Moore, a long-time champion of the environment, instilled a legacy of environmental consciousness at Intel that continues today. Intel strongly encourages its employees to apply the same level of knowledge and creativity to solving the environmental challenges of design and production as they do to creating and developing the next breakthrough technology.

“We strive to minimize our environmental footprint and achieve the highest standards of environmental consciousness in everything we do, from how we design

and manufacture our products to how we build and operate our facilities, manage resources, and handle waste materials” [18]. In order to adhere to this environmental philosophy, a “design for environment” approach is being used.

Building and designing the world’s most sophisticated products in cutting-edge factories involves addressing many environmental challenges, such as energy efficiency, air quality, water and materials recycling, and more. These challenges grow in complexity as we push the technological boundaries and explore the limits of materials science at Intel.

The Rational for the Adoption of a Sustainability Mindset

It goes without saying that energy-saving designs will cut down on maintenance costs in the long run. This simple example shows how three factors: social, environmental, and economical, merge to form a sustainability mindset. To change someone’s mindset to that of Sustainable Development, a socially responsible organization will constantly evaluate the weight of these three main elements during the decision-making process. However, the corporation’s true commitment to environmental sustainability is shown when one of the elements is not fully met, and that element is usually the economic one. When the ROI is questionable, only an organization that sincerely adopts and believes in its social business responsibility will decide in favor of a Green Building.

Processes and Procedures for High-Quality Results

Intel operates a Corporate Services (CS) entity to self-manage real estate assets, construction, operation, maintenance, and general services. The associated teams and groups are well educated to ensure that proper codes, standards, and procedures are followed at a defined level of quality. Being a global company, these business procedures are managed practically the same all over the corporation.

The Intel Construction Management Procedures (CMP) database incorporates standards and specifications that are well defined to ensure a building’s trademark profile uniqueness, quality, flawless data communication; and that it is based on industrial cost benchmarks. Corporate policies, specifications, and standards are updated through a global consensus change process, after verifying the justifications and the outcome benefits. This process requires that every stakeholder group, affected by the change, will review and confirm all changes before final approval and deployment.

Innovations by nature are being executed based on the same processes. Intuitively, innovations may be implemented and deployed more effectively if they are based on clearly stated corporate values and on the use of existing business processes. In this context, Green Building innovation falls under this category. The major challenge was to justify throughout the approval chain that the changes did indeed comply with Intel’s basic rules.

CHALLENGES AND SOLUTIONS

Strategic Core Team

The strategic core team consisted of Project Engineering, Environmental, Health and Safety (EHS), and Public Affairs (PA). These stakeholders were invested in building an environmentally sustainable building, where EHS took the role of environmental responsibility, PA took the role of social responsibility and communication, and engineering provided the practical green building planning, design, and execution.

Corporate Approval for an Innovation

The project’s stated mission and the building’s type created a clear message that the approach to build a sustainable building required a new mindset. An Internet search revealed the “Green Building” advantages and activities around the world. The “Smart Building” strategy for the new Intel R&D center in Israel has been converted to a “Sustainable Development, Green Building.” LEED was chosen as the project rating system. The new Israeli standard SI-5281 was in its development stage at that time, and it was later adopted by the team as a second rating system.

The concept of a green building was first presented to high-level corporate managers to avoid or eliminate potential roadblocks allowing for a flawless review throughout the regular approval process. By getting their approval, midline managers were able to focus on standard construction procedures, without the need to make decisions on innovative strategies. The approval to add capital cost and ROI was left to upper management, where the advantages to the business as a whole, and to the corporate profile, could be better evaluated. As a result, the scope of the project and the budget for a Green Building have been approved. The building’s imaging picture and its facilities are shown in Figure 5.



Figure 5: The building’s imaging picture and its facilities

Integrated Design Process

All Intel building designs are integrated, which means that Contracted Architects and Engineering (A&E) firms mobilize all the required personnel from the start. Teams, made up of owner’s engineers, A&E, and construction managers create owner/contractor groups called Discipline System Teams. By leveraging this process and implementing the same practice in the green building project, we have created a “Green Building” team, made up of both the design managers and the LEED consultant. Owning the management charter and authority, this core team enabled a flawless and directly controlled process, and it coordinated and led single and multi-discipline discussions where ideas, solutions, and cost evaluations were hammered out. For instance, this was the most effective way to bring the Architect, HVAC, and the electrical consultants together at the early stages of the design so that they could discuss natural daylight strategies and consequences, when building envelope options had just been developed. In addition, it was the best method to start the commissioning process. System teams created an effective structure to define and execute the enhanced planned commissioning processes during project design, execution, and delivery.

Preliminary Cost Evaluation and ROI

Initially, during programming (conceptual design), the project team assessed credits options and opportunities that were defined by the site conditions and parameters. A preliminary techno-economic Return of Investment (ROI) study encouraged the team to proceed (see Figure 6).

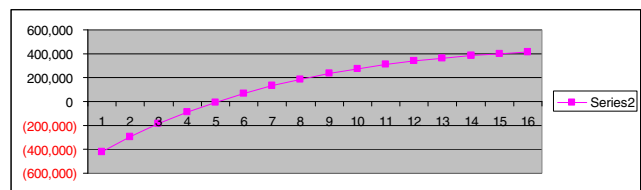


Figure 6: Model used to estimate ROI

This assessment determined LEED “Silver” as a feasible target. The processed preliminary study showed potential operational savings that could cover the estimated premium of less than one percent (<1%) in less than five years. These figures are in line with the works of Davis Langdon [15] and Gregory H. Katz [14]. Actual premium construction costs are still being tracked and will be published after occupancy. However, a few details and remarks can already be made:

1. The design cost did not increase due to the green building scope, relative to the company’s regular benchmarked cost. The Green Building contract paragraph contained a clear expectation that the design to efficient systems and structures was a basic expected professional approach, while no unique system consultancy was required (i.e., renewable energy was not implemented).
2. The new role of the LEED Accredited Professional consultant added a reasonable additional cost required for documentation, meetings, and communication with the design consultants and the third-party audits.

3. Certification fees of \$12,500 were based on the building size.
4. Premium construction costs are referenced to the standard new Intel constructed R&D building. In this project, we have estimated less than \$600,000 in construction premiums. Cost distribution (see Figure 7) shows that most of the premium costs are due to energy improvements (40%) and indoor environmental quality improvements (35%). These improvements costs were estimated to save more than \$200,000 a year.
5. The estimated savings did not include immeasurable impacts like productivity, absenteeism, public affairs gains, or “Green” marketing results.
6. ROI was based on total premium costs to total operational cost savings assuming that the LEED-Silver target is achieved. Four sub-projects above the Silver requirement were kept as a contingency to cover for potential missed targets.

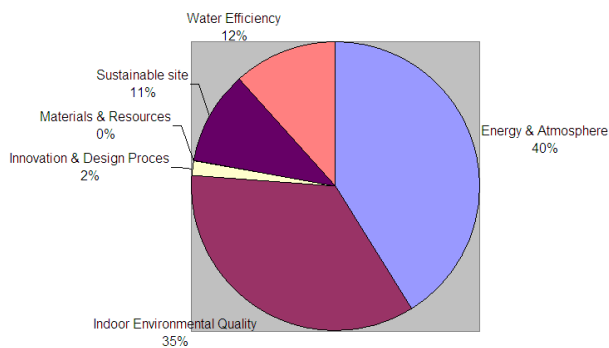


Figure 7: Project premium's cost distribution

Based on the feasibility study's positive results followed by corporate approval, the Public Affairs group got the green light to release information on the initiative internally and also externally to the public.

Intel's Social Responsibility Results

Intel's commitment to corporate responsibility, together with its positive media exposure and support from public officials, lead to numerous invitations from organizers of the foremost corporate and social responsibility conferences in Israel.

The “Green Building” was a great platform to promote Intel's relations with key government officials and leaders. Israeli Prime Minister Ehud Olmert, who laid the cornerstone for the “Green Building” during the ground-breaking ceremony, expressed deep appreciation for Intel and called on other companies to follow in Intel's footsteps by cultivating and advancing environmental awareness.

Extensive newspaper coverage of the establishment of the “Green Building,” including features in Israel's largest daily newspaper and leading financial publications, have described Intel as a leader in the field of corporate responsibility and care for the environment. At a leading and well communicated Social Responsibility conference in Israel (Maala), which highlighted local corporations' activities, Intel Israel's CEO delivered the keynote address to the leaders in this field and described Intel's commitment to the global environment. These publications created a baseline that triggered Intel's supportive involvement in the local sustainable construction industry.

Greening Israel Construction Industry

As a way to better sense the local industry capabilities, the project team started to participate in local conferences, starting as members of the audience. Driven by the vast exposure to the public of the Green Building, the requests to participate as presenters were only a matter of time. The project has been presented at several events to architects, engineers, enterprises, and building owners. The project engineer participated as an Intel member in the local Green Building Association, bringing with him a unique experience in leading an active Green Building project. The project was volunteered as a pilot to establish the new Israeli Standard SI-5281 just issued at that time. Today Intel is mostly appreciated for its representatives' activities within the association's framework.

Green materials suppliers were exposed for the first time to new business opportunities. The project procurement strategy to create competitive bids required more than one supplier for each tender. In the case of paints, only one local qualified supplier was valid. A second well-known manufacturer was disqualified because he did not have the required formal document to prove his product's sustainability. Driven by business considerations, the manufacturer sent his samples to a certified known test lab out of the country, certified his product, participated in the bidding with the appropriate documentation, and finally was awarded the contract on account of his lower cost. In other words, a win-win situation.

The green building will have a modest visitor center to educate the public about the building's sustainability. The building is still under construction, but visitors and groups are already being hosted in the adjacent existing campus and attend lectures on the green features, ideas, and opportunities. Among the hosted groups are construction managers, students, journalists, hi-tech operation managers, and more. The stated team's mission to support and green the local industry begun months before the project was even completed and certified, through

community involvement and by exposing the challenges of making the R&D building green.

Intel R&D Green Building Design Features

The following are the implemented strategies to achieve a LEED-Silver rating:

- The building includes a data center, a high-energy consumer. The building’s heating system is based on heat recovery from the DC water-cooled condensers. Recovered heat is also used for preheating of the domestic hot water supply to the kitchen and gym showers. There is no conventional fuel-powered boiler heating system.
- Sufficient daylight and enhanced ventilation increase employee satisfaction, productivity and health, key factors in reduced absenteeism.
- The façade includes reflective panels to maximize daylight penetration, providing natural lighting levels to more than 75% of the occupied areas (see Figure 8).

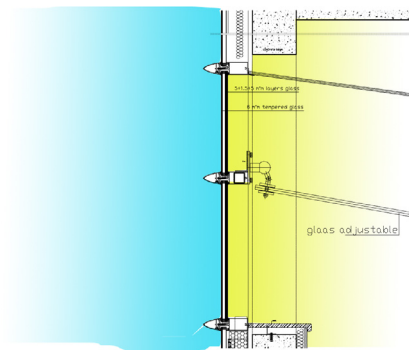


Figure 8: Internal reflective panel used to maximize daylight penetration

- Indigenous plants and controlled computerized irrigation will reduce water usage by 55% at mid-summer.
- A 31% reduction of water usage and related sewage will be achieved by efficient urinals, dual flush water closets, and low-flow faucets and showers.
- The gardens will be watered by an automatic irrigation system using recycled (condensate) water. A HVAC condensate water drain, collected at a rate of 5300 gallon/day during summer, is sufficient as the sole source of irrigation (no potable water is required).
- Lighting fixtures’ controlled system enables each fixture to be dimmed separately (DALI com protocol).
- The quantity of fresh air in the offices is controlled by a CO2 monitoring system to save cost and improve ventilation.

- As a prerequisite, a recycling program for non-hazardous waste was implemented during the building’s life-cycle.
- Two symmetric patios allow daylight penetration deep into the office at the three upper floors, combined with automatic daylight controlled lighting (Figure 9).

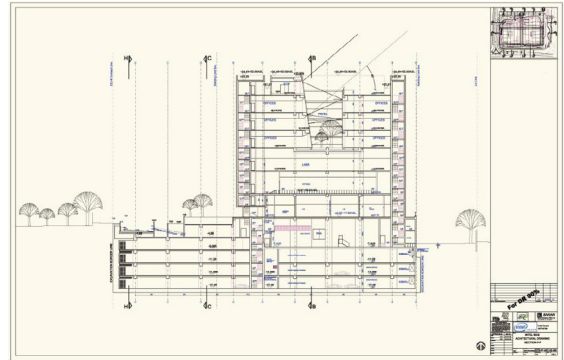


Figure 9: Building section showing patio and north tilted reflecting surface

- Individual light and thermal comfort is controlled via a Building Management System.
- Each worker will be allowed to adjust his ambient air comfort and overhead lighting from his or her personal computer.



Figure 10: Green roof and patio aperture

- Heat islands are reduced by planting a “Green Roof,” and by using reflecting materials, shades, and landscaping. The “Green Roof” (Figure 10) also provides thermal insulation to the highest story (Level 5).
- The building site was originally a parking lot so there is no damage to natural assets.
- The site is located at a walking distance from main transportation stations, such as a train station, a central bus station, and a city bus (Figure 11).



Figure 11: The building position (in blue) relative to the original parking lot, walking distance from main transportation

- Motors and chillers were chosen to save on energy consumption (using Variable Speed Drives and high-efficiency motors).
- Bicycle Storage (for 40 units) with showers and changing rooms for the bicyclists' benefit are located in the underground parking area.
- The best environmental measures will be used in the construction to reduce dust, wheel tracks' wash and storm water runoff (Figure 12).



Figure 12: Storm water run-off prevention during construction

- The quantity of storm water runoff post-development has been kept less than that of pre-development.
- The paving of internal roads and pavements was offset by developing the adjacent public area with plants, while 50% of the building footprint is covered by "the Green Roof."
- A glazing surface area (low-e type) has been reduced on East/South/West facades (Figure 13).
- Only low-emitting (low-VOC) paints, adhesives, and sealers are applied.

- A carpool policy is implemented.
- A measurement and verification plan will be implemented during the first year of operation. Lessons learned will be available for other projects.



Figure 13: Building illustration, South-West view

- 10%-20% of all supplies will be made up of recycled material (a fraction of all supplied material costs).
- Forest Stewardship Council certified wood will make up 50% of the wood used in the building (doors, finishes, furniture).
- Construction waste (Figure 14) is recycled or reused (parking lot asphalt is reused on site; soil and aggregates were reused at adjacent construction site: steel, wood, cardboard, organic materials, etc. to meet the target of keeping 50% of the construction waste from having to be disposed of).
- Neighborhood density: the building is built within a dense neighborhood where the built area to surface exceeds 60ksf/acre (15ksf/dunam) within a radius of 990 ft.



Figure 14: Rock waste crushed on site and recycled

- The lobby includes a display area ("visitor center") and interactive presentations to educate visitors and employees about sustainable construction and the building's features.

- An enhanced commissioning plan is provided to ensure the building complies with the design intent, includes the strategic features, and is built to full owner satisfaction.

SUMMARY

Key Differences in Green Building Use/Sustain

Greening an R&D building has many functional, economical, environmental, and social advantages and is proven to be a logical construction strategy in today's world. The utilization of used materials diverts much construction waste from landfills. The modular design and use of recycled materials wherever possible, supports fast and low-cost modifications and retrofits down the road. The Green Building indoor environment enhances employee productivity, thereby retaining employees, reducing absenteeism, and enhancing researchers' concentration, which all results in gains for the corporation. Implementing recycling strategies during the life of the building helps to reduce waste and the cost of resources. Further, this reuse, recycle mindset becomes habitual for employees and is carried over into their after-work lives. The building site and planning maximizes natural light penetration thereby reducing operations and sustaining costs, and thus increasing corporate profits. Saving energy reduces CO2 emissions and subsequently global warming. Water-saving strategies reduce depletion of a valuable resource and reduce overloads in municipal waste systems.

Last but not least, Intel Green Building boosted employees pride and morale. The employees are proud to be the leaders in promoting Intel's corporate responsibility initiatives.

Leveraging the Success for the Future

The IDC9 building is not only the first registered Intel project to be certified as a "Green Building" project; it is also a role model for the Israeli construction industry. The challenge now is to ensure that this "green" mindset will continue to grow and will become part of Intel's construction standard as well as being implemented in the Israeli construction industry.

Intel has registered another two of its buildings to be certified by LEED-EB, the rating system for existing buildings. The lessons learned from the R&D project will help Intel with these two projects.

Motivating Innovation Initiatives

It was a challenge to drive innovative strategies in three broad areas: transform a structured corporation (Intel) engineering business process to include an innovative

"Green" component and get consensus on this new mindset; succeed in getting the Israeli national construction industry to implement a "Green" mindset in how they conduct business; and to be audited and awarded certification by third-party experts.

In order to encourage continued employee engagement we are planning an internal campaign for employees to strengthen the connection between the "Green Building" and out-of-the-box environmental thinking.

The key message from the authors is to motivate: we now know it is possible to execute a local and innovative initiative successfully, even in global corporations, once it supports clearly-stated corporate values.

ACKNOWLEDGMENTS

The authors thank the people who supported us in transferring our huge collection of material into one readable paper:

Amir Roggel for his masterful help with the writing of this technical paper.

Ted Reichelt for his encouraging mentoring.

Alan Schijf for his focused directions.

Special thanks to Marian Lacey for her guidance and patience.

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