Interreg
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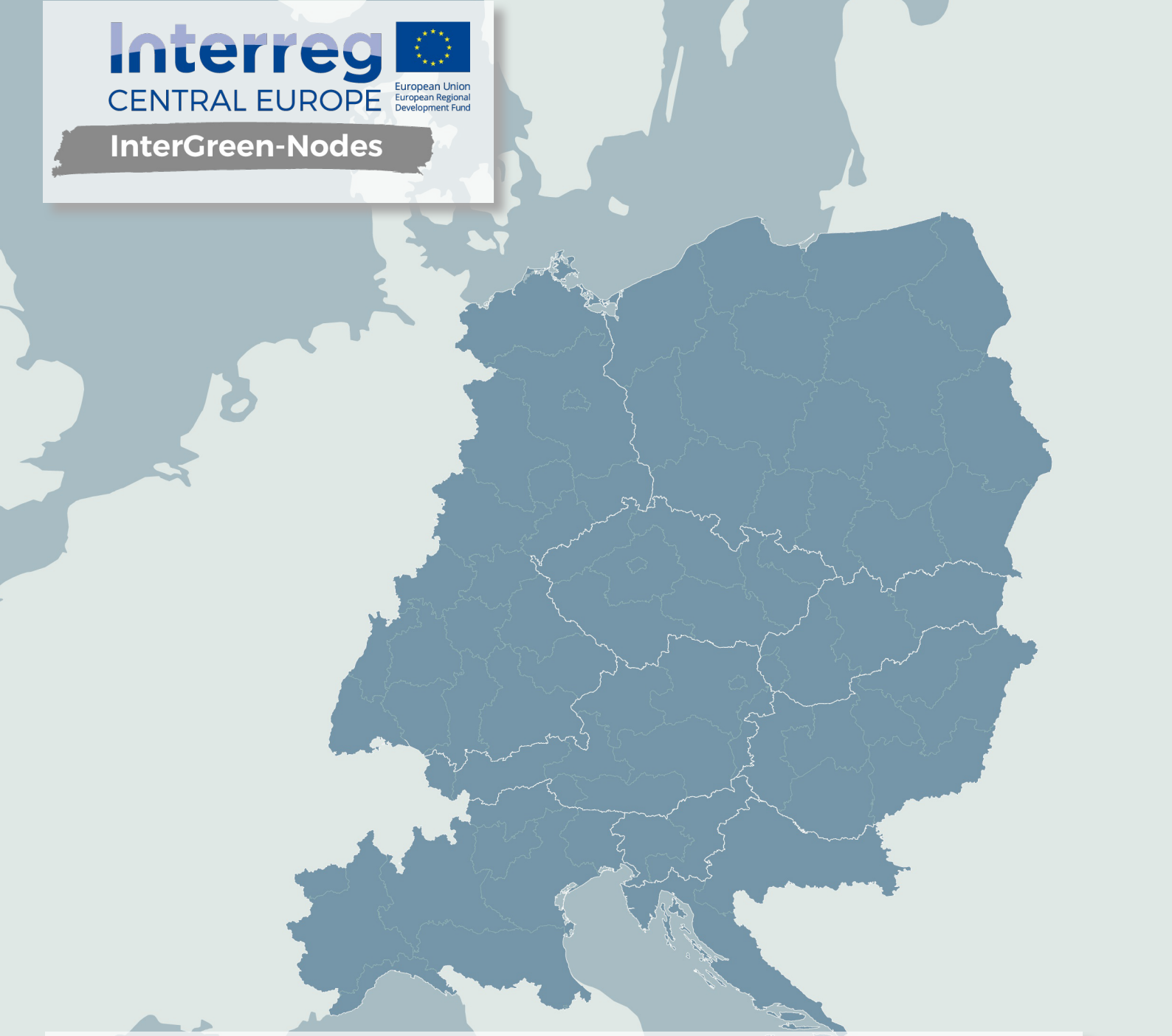
InterGreen-Nodes



CE1444: InterGreen-Nodes

HANDBOOK FOR THE ADOPTION OF CLEAN FUELS AT TERMINALS

PART 1: BUILDINGS

TAKING
COOPERATION
FORWARD

Index

1. Introduction

Developing innovative solutions for transshipment nodes is risky and ressource-intensive.

The InterGreen-Nodes project tested, demonstrated and evaluated a number of possible solutions. They were implemented, tested and discussed with the ports and terminals in the InterGreen-project.

In order to help other ports and transshipment facilities to impelemnt similar solutiopjns, the project set up a series of three handbooks, that cover the following topics:

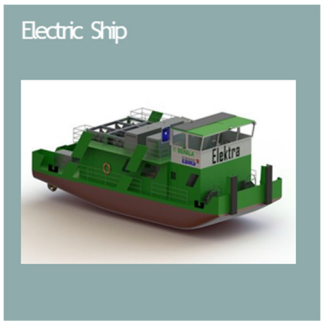
- Handbook 1: Buildings and built infrastructure requiring buildings;
- Handbook 2: Use of clean, mainly electric vehicles;
- Handbook 3: Use of clean energy systems and energy storage systems.

1.1. Overview over the handbooks and their content

HANDBOOK 1: Buildings and built infrastructure requiring buildings

	***Where:*** Berlin (Westhafen port)
	What: Developing and operating an innercity-cargobike hub on the port premise.
	Potential Impact: Shifting freight from truck to cargobike on the last mile, with the potential to use rail for the main run (using the ports rail-road transshipment facilities).
	***Where:*** Port of Budapest
	What: Using BREEAM and LEED ratings to make the effects of environmental friendly building measurable.
	Potential Impact: Environmental friendly building in the areas in energy, land use, materials, pollution, transport, waste and water.

LNG Infrastructure 	***Where:*** Freight Village Bologna
	What: Developing and operating an LNG gas station for trucks, to be used by customers of the freight village.
	Potential Impact: CO_2 reduction (exact numbers still pending).
Solar Energy 	***Where:*** Berlin (Westhafen port) and Port of Koper
	What: Using solar energy to complement the energy mix used by a port.
	Potential Impact: CO_2 reduction (exact numbers still pending).
H2 Energy Storage systems 	***Where:*** various
	What: Using hydrogen fuel cells to store electric energy during high availability times and use them when high energy demand arises.
	Potential Impact: Flattening usage peaks and storing energy from clean energy production, making clean energy use economically more viable).

	***Where:*** Berlin (Westhafen port)
	What: Using an electric ship (with battery electric and hydrogen energy storages) instead of diesel driven ships for transport on inland waterways.
	Potential Impact: Significant CO_2 reduction (exact numbers still pending).
	***Where:*** Berlin (Westhafen port)
	What: Changing port operation processes from conventional (diesel) fuel driven processes to electric drives (e.g. trucks, internal terminal freight transport, general purpose cars, utility vans, rail shunting vehicles).
	Potential Impact: CO_2 reduction (exact numbers still pending).

1.2. How to transform your operation

Based on the experiences from the InterGreen-Nodes project, we recommend the following steps, in order to achieve a lasting and sustainable results:

Step 1: From a Task Force:

The implementation of clean solutions into your operations can be challenging and complex. Usually, numerous different areas of your operation will be impacted, ranging from transhipment and transport over energy use to funding and accounting of measures. Sometimes it can be beneficial to include customers or regional officials.

Identify relevant persons and functions at our organization and form a task force, in order to include all perspectives and viewpoints. Regular meetings can be helpful, but at a minimum, all task force members should be updated on any progress regularly and actively asked for their opinion, if their field of expertise is touched upon.

Open discussions, especially at the beginning can help identify possible problems as well as opposing goals.

Step 2: Identify fields of action

The areas, in which clean solutions can be implemented vary widely. To gain an idea what possibilities you have, you can utilize the handbooks in this series and the examples described.

If you are implementing measures of this sort, the first time, it could be advisable to pick a small scale implementation project, such as substituting existing diesel-driven vehicles with “of-the-rack” electric vehicles.

A field of action could also be the use of solutions on a project, you are anyway planning to realize, such as the use of green-building-ratings on a construction project.

To ensure a seamless implementation, include the task force from step 1, into your decision.

The result of Step 2, could be a list of possible actions.

Step 3: Calculate probable outcomes

A first quick calculation on costs and CO2-savings can help you make a first decisions and circle in, on a number of solutions, you would like to focus on.

The InterGreen-project developed a methodology that can help you, do this calculations. You can find it on the InterGreen-Website:

https://www.interreg-central.eu/Content.Node/InterGreen-Nodes.html

The three files you need are:

- Fact Sheet of Key Performance Indicators (KPI) System: https://www.interreg-central.eu/Content.Node/InterGreen-Nodes/CE1444-O.T3.1-fact-sheet-Tools.pdf
- Standard Operating Procedure (SOP): https://www.interreg-central.eu/Content.Node/InterGreen-Nodes/CE1444-O.T3.1-SOP.pdf
- KPI System Excel file: https://www.interreg-central.eu/Content.Node/InterGreen-Nodes/O.T3.1-Basic-Model-KPI-System.xlsx

Step 4: Form a strategy

Plan your next steps. This handbook series can hep you to identify these steps, absed on the experiences of others.

Discuss the strategy with your task force from Step 1.

Step 5: Implement

Step 6: Use results for marketing an PR

Include your marketing department and draw up a strategy, to inform others about your success.

2. Cargobike-Microhub Pilot in Berlin

2.1. The Basics

A parcel service providers uses an inner-city transhipment point with micro-depots operated by a neutral provider, the “Berliner Hafen- und Lagerhausgesellschaft mbH” (BEHALA), at the Westhafen port. The microhub is, for reasons of simplicity and low costs, comprised of shipping containers. The containers are used as short-time storage and transhipment point for the last few kilometers of shipment, for the delivery with the company's own cargo bikes.

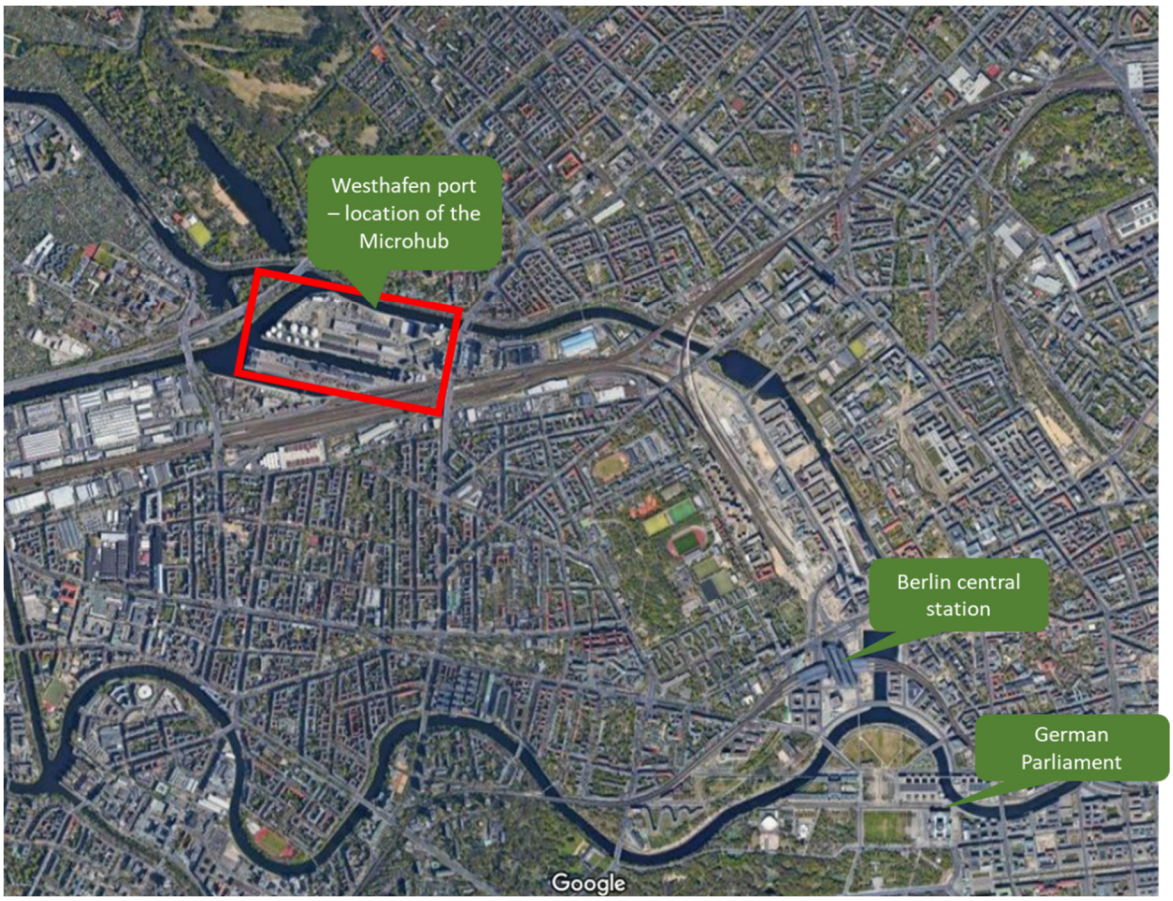


Figure 1: Central location of the Microhub, close to a number of points of importance in Berlin

The central location of the Westhafen port is especially well suited as a location for a microhub for a number of reasons:

- First and foremost, the Berlin Westhafen is located centrally in Berlin, close to the city center and in close vicinity to a densely built-up area with a large number of dwellings and businesses.
- The Westhafen is publicly owned (by the public owned company BEHALA), making it a neutral location for a private logistics provider.
- The Westhafen, as any port is also a specialised logistic area, with connections to other transport modes and equipment and facilities for transhipment and storage.

The micro-depot is the central starting point for deliveries to the surrounding delivery area. The parcel provider acts independently and within his delivery system - from the morning delivery of the shipments to the micro-depots, through interim storage, to the subsequent delivery to the end customer. The parcel service provider delivers daily and locally emission-free to business and private customers in the vicinity of the Miko depot.

2.2. Step by Step description of the implementation and Lessons Learned and Experiences

Setup:

The suitability of an area for setting up a micro-depot location depends on various criteria, so that every location decision must be considered as an individual case. Criteria include a high volume of consignments in the delivery area, a high number of stops, the consignment structures of the respective companies and the connection and accessibility of the location by road. Furthermore, the space costs (rent or similar) must be economically viable, especially from the company's point of view.

With regard to the micro-depot location, various requirements regarding the container and site equipment, the workplace ordinance and the safety precautions on site must be met. The location should have a permanent connection to the power grid, if necessary this must be established. In addition, the area should be made available to companies for a reasonable period of time. As a guide, guaranteed land use for two to five years is considered sensible. This is necessary above all in order to enable the actors involved to plan with certainty and thus to increase interest in the area and the implementation of the concept.

Any available, public or private area would be suitable as a potential location, even for a limited period of time. The space requirement depends on the planned design of the micro-depot. The area for setting up a container plus maneuvering areas can be set as the minimum size for each service provider involved. A general calculation of the space requirement proves to be difficult, as various requirements are placed on the use of space.

Specific requirements must also be met with regard to site equipment, which should always be taken into account in the case of temporary land and infrastructure use. When setting up a micro depot location, ensure adequate lighting and a suitable power connection. For the use of sea containers as micro-depots in the CEP area, ramps with a minimum width of one meter and, if necessary, standard racks for shipments must also be provided. In addition, the use of technical devices for heating the living room must be taken into account and a roof drainage system must be installed. These are particularly necessary for operation in bad weather or in winter. The ground conditions on the site must also be adapted for operational use, e.g. with cargo bikes. In addition, separate lanes should be provided on the site so as not to restrict the operations of several cooperating actors. The construction of e-charging infrastructures to enable operation with e-delivery vehicles also seems advantageous in the future.

Further requirements result from the work and business premises ordinance. For example, a gender-appropriate toilet with water connection must be available. In addition, a changing room with a place to retreat and as a lounge for delivery staff must be provided. The premises are to be equipped with heating and cooling technology to regulate the temperature on hot or cold days. Also various areas of law and regulations must be observed during operation. The municipal business premises ordinance requires a series of standards that are temporarily quite difficult to

implement: disposal, air conditioning/heating, sanitary facilities, occupational safety and fire protection. These are areas that require competent support and advice when implementing the project.

From the point of view of safety precautions, a locking device for access to the site and a lockable storage facility for cargo bikes and vehicles must be provided. In addition, a stable fence around the site is necessary to protect the micro-depots and vehicles from vandalism and theft. However, turning and maneuvering processes should be as unrestricted as possible in order to ensure a high level of efficiency in the logistics processes. The site should also be monitored by cameras. Among other things, the General Data Protection Regulation must be observed.

Figure 2: General setup of the hub

Operations:

Starting from the distribution centers of the parcel service providers, the shipments for the tour area around the micro-depot were delivered to the Microhub location. The distribution centers are predominantly located on the outskirts of the city. The feeder traffic was implemented using delivery vehicles with a permissible total weight of 3.5 t to 7.5 t. In many cases, the shipments were already pre-picked for the day trips of the cargo bike deliverers. At the location, the shipments were transhipped and stowed in the respective micro-depots of the parcel service provider. Corlettes were sometimes used for this in order to speed up handling. However, consignments that were too large or bulky remained in the delivery vehicle of the feeder traffic and were delivered conventionally during the day.

The delivery personnel began their day tour by preparing the cargo bike and stowing suitable shipments in the cargo bike according to the planned tour. The smaller dimensions of the cargo bike had to be taken into account, which meant that only some of the shipments could be stowed in the cargo bike. For this reason, the micro-depot was sometimes approached several times per day tour in order to fill the cargo bike for the further course of the tour. The operative business took place within the scope of the project on five working days per week. After the day's tour, all undelivered shipments and returns were transported back to the micro-depot and finally back to the distribution center.

2.3. Cost and emission effects

The initial costs for setting up the microhub (without land-plot costs), comes down to about 100.000 €:

Cost per kg potential payload and 10.000km:	Construction costs
Planning and Administrative Tasks:	1.000,00 €
Technical equipment:	3.900,00 €
Container:	59.000,00 €
Construction-work:	36.100,00 €
Total:	**100.000,00 €**

Vehicle costs are highly dependent on the exact operational structures and constraints. So the actual costs of a cargobike can vary widely and be above as well as below a typical diesel-driven freight vehicle.

To allow at least for some form of comparison, a cargobike with a maximum payload is compared with a truck with a gross weight of 3.5t (which equals a payload of about 1.400 kg), in the following:

	Typical 3.5t vehicle	Cargobike
Yearly depreciation	12.000 €	2500
Energy price per 100 km	20 €	1 €
yearly mileage (km):	90.000	90.000
Maintenance costs per year:	2.000 €	150 €
Driver costs per vehicle an year:	55.848 €	55.848 €
Maximum payload:	1.400	250

Cost per kg potential payload and 10.000km:	Typical 3.5t vehicle	Cargobike
Depreciation	0,9524 €	1,1111 €
Energy	0,0016 €	0,0004 €
Maintenance	0,1587 €	0,0667 €
Driver costs	4,4324 €	24,8213 €

Emission-effects, just as costs, depend very strongly on the operational boundary conditions, but also on the layout of the logistics-system. However, vehicles and their emissions per kg payload can be calculated and compared as follows:

	Typical 3.5t vehicle	Cargobike
Diesel consumption per 100 km (l):	11	0
Electricity consumption per 100 km (kwh):	0	2,5
kg CO2-emission per 100 km*:	29	1
Maximum payload:	1.400	250
kg CO2-emission per 100 km and 100 kg payload:	2,06	0,40
***at an emission factor of 3.165 for Diesel and 0.4kg per kWh electricity (based on the electricity mix for Germany in 2020).**		

3. BREEAM and LEED Ratings

3.1. Introduction of the Freeport of Budapest Logistics Ltd.

The Freeport of Budapest Logistics Ltd. (FBL) was established as the legal successor of MAHART-Freeport Public Company on September 1, 2005. The company has a 75-year operating right of the Freeport of Csepel and the usufruct of the properties in the area.

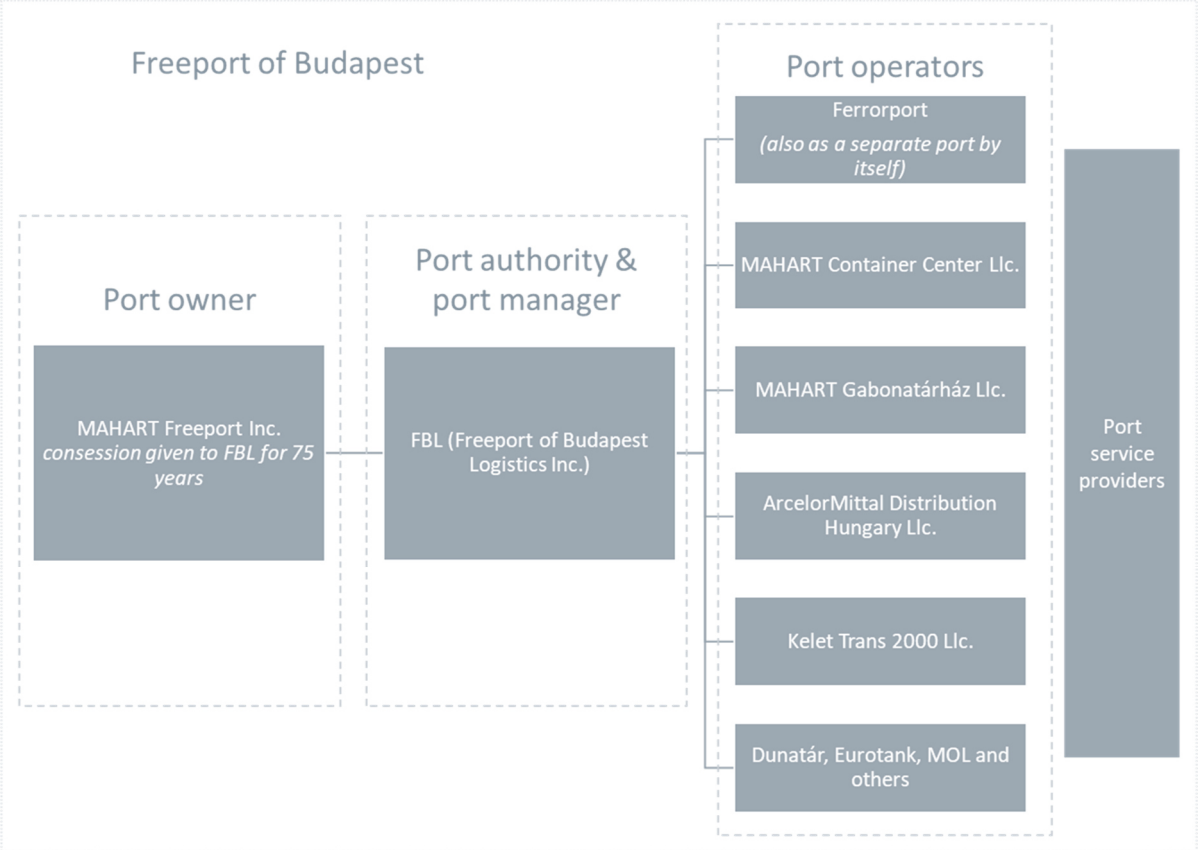
The land area operated by FBL Ltd, which provides full port services, is approximately 108 hectares. A total of 18 berths have been built in its three operating basins. There are more than 157,000 square meters of covered warehouse space in the Port area.

The port offers a full range of rail and shipping services for our customers, and there is also a Ro-Ro terminal in the Port area.

One of the main activities of FBL Ltd. is the leasing of real estate, within the framework of which about 34 hectares of free space, more than 157 thousand square meters of covered warehouse space and more than 10 thousand square meters of office space are used by more than 70 tenants operating in the Port.

The Freeport of Budapest is located in the 21st district on Weiss Manfréd road between the city center and the M0 ring road. It is 5 km from the city center and 7 km from the M0 ring road. It is available by trucks on roads without weight restrictions, while the allowed railway axle load is maximized in 20 tonnes.

The ownership and operator relationships in the port are illustrated in the figure below:



Main characteristics of the port activity:

- There are three commercial basins for waterborne freight companies;
- Ro-Ro port for loading cars, trucks, and other equipment, and associated storage area;
- Management of the turnover of oil derivatives in MOL's commercial basin;
- 18 berths;
- The ship mooring service is provided by the port with its own tugboat;
- Guarding service at Danube moorings and port basins for the continuous safety of goods and staff.

Railway connections and internal track network:

- A 15.47 km long internal track network is available to handle incoming and outgoing trains;
- 20 tonnes of axle load;
- Connection to the MÁV network - TEN-T core network element.

3.1.1. Project experiences from FBL

In the last decade, FBL has implemented or participated in a number of domestic and international projects as project partner, thus gaining significant experience in the field of project planning, implementation, networking and partnership building. Of these, we present the transnational cooperation projects in particular:

Interreg DBS Gateway Region:

The DBS Gateway Region project aims to develop the Danube-Black Sea region to become an attractive area for maritime and inland waterway freight transport between Central Europe and the Black Sea, as well as between the Caspian Sea and the Far East. The project aims to

achieve these goals through intensive and high-quality cooperation and professional dialogue between ports, regions and other key players.

The project was implemented from the Danube Transnational Program, with the support of the European Regional Development Fund, co-financed by the European Union and the Hungarian State.

Interreg TalkNet:

The TalkNET project was created to promote sustainable transportation. The initiative, with a total of 15 project members, focuses on improving coordination between market players in order to facilitate the integration between ports / land terminals and carriers and to strengthen the efficient and sustainable multimodal logistics hubs.

The project was implemented from the INTERREG CENTRAL Transnational Program, with the support of the European Regional Development Fund, co-financed by the European Union and the Hungarian State.

Interreg CORCAP:

The aim of the project is to facilitate efficient, environmentally friendly freight transport along the Rostock-Budapest section of the OEM corridor. The steps taken to improve the quality and use of the existing infrastructure contribute to a more sustainable freight transport. Improving connections between intermodal hubs and inland ports and exploring new intermodal services offer tangible benefits for a more efficient freight transport.

The project is implemented from the INTERREG CENTRAL Transnational Program, with the support of the European Regional Development Fund, co-financed by the European Union and the Hungarian State.

3.1.2. FBL's participation in the InterGreen-Nodes project

The FBL contributes to the objectives of the InterGreen Nodes project, ie the improvement of coordination between freight transport participants, by presenting a forward-looking good practice by developing the D.T3.2.4 study.

The following chapters present the current situation of the Hungarian LEED and BREEAM green certification systems in Hungary, with special regard to Budapest and the Pest County region. The FBL recognized early on that the green certifications prevalent in the office real estate market could also appear in the case of industrial properties, especially warehouses, thus it presents its own experience through warehouse halls.

In accordance with the professional standard of the work, we processed the presented topic according to a carefully developed methodology, for which we used the following tools:

- conducting in-depth interviews with market participants: real estate developers, certification, consultants;
- office market analysis: getting to know statistics and analyses, exploring connections;
- review of certification systems, collection of certification organizations in a database and
- a multi-criteria comparison of selected warehouse halls based on the methodological materials received.

3.1.3. The hypothesis behind the good practice and the development concept represented by FBL

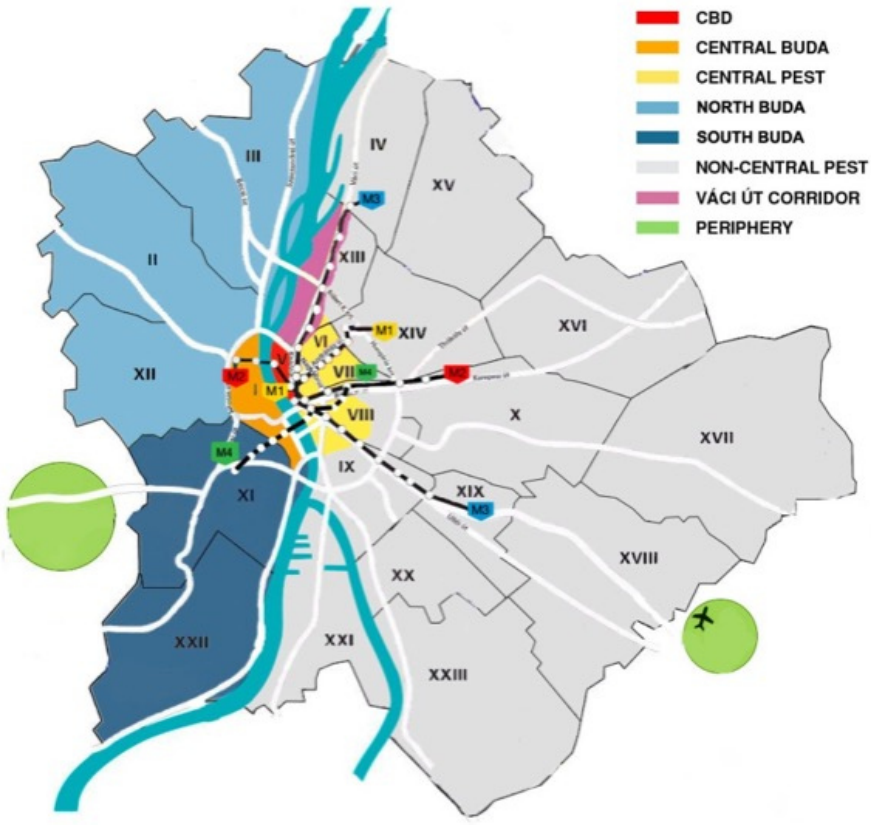
The Freeport of Budapest Logistics Ltd. (FBL) is committed to sustainability and environmental protection, therefore, it is important for them to get to know good practices, monitor market trends in this field and apply these forward-looking solutions in their operation.

In the InterGreen Nodes project, the situation of LEED and BREEAM certifications in Hungary will be presented by them, the experiences related to these certifications, as well as a form of forecast along the following hypothesis:

The hypothesis is that the spread of "green" certifications in the office market will also be followed by the market of industrial real estate (warehouses, production halls), as they will become an unavoidable factor in the development of newly built real estate.

In order to examine the hypothesis, in addition to the professional work with BSZL, we conducted interviews with two market participants, so in addition to the point of view of the real estate developer, we also learned the opinion of the accredited experts performing the certifications, thus receiving a complete view on the expectations, business decisions and the process and time required for the rating and the associated costs.

In the course of the study, we analyzed mainly the office and industrial real estate markets in Budapest and Pest County, as the vast majority of such properties are found in these locations in Hungary, and there are higher concentrations within these territorial units as well, which are presented in the interview findings.



3. Figure: A map of the Budapest office submarkets (Illustration by BRF)

Focus on LEED and BREEAM ratings

We use the LEED and BREEAM certifications to present the market for green certifications in Hungary, as FBL has gained experience in the development and operation of such buildings. Four of their warehouses have one of these certifications, which are pioneers in their respective categories.

- BSZL C1 – LEED Silver
- BSZL C2 – BREEAM Good
- BSZL B9 – BREEAM Good
- BSZL E2 – LEED Silver

Buildings C1 and E2 were rated LEED BD + C: New Construction v3 - LEED 2009, while buildings C2 and B9 were rated International 2016 New Construction: Bespoke and International 2016 New Construction Commercial.

As can be seen, the certified warehouse buildings have reached the entry levels of the rating scale, but it is possible to reclassify these buildings in the future if there is a significant change in operation or technical design.

To confirm the hypothesis, in the next chapter we review the current situation of the domestic office market with the help of the MNB's (Magyar Nemzeti Bank) Commercial Real Estate Market Report.

3.2. Presentation of the Hungarian office market, trends, capacities and significant developments in progress

The comprehensive report on the Hungarian commercial real estate market was published by the Magyar Nemzeti Bank (MNB) in April 2020, from which we gain insight into the state of the real estate market in 2019, its main indicators, as well as new developments.

In the following, we present the domestic office market with the main findings of the MNB's analysis, and in later chapters the green certification of offices and the changes that will take place.

MNB – Commercial Real Estate Market Report (April 2020)1

Current status and developments on the commercial real estate market

In line with the trends from past years, strong rental, investment and development activity remained typical for all segments of the domestic CRE market in 2019 again. As an ongoing trend, demand was met by sluggish supply, leading to decreasing vacancy rates and an increase in rental rates over the year. The appearance of new supply on the market fell short of the expectations for all types of real estate, and late completion remained a constant feature as in previous years. The Budapest office market was characterised by very strong development activity, along with the hotel sector at the national level, with an increasing focus on the capital observed in that sector. Vacancy ratios remained historically low in all market segments throughout the year, with the average vacancy rate of modern Budapest offices falling to 5.6 per cent and that of the industrial-logistics market in Budapest and its vicinity dropping to 1.9 per cent by the end of December 2019.

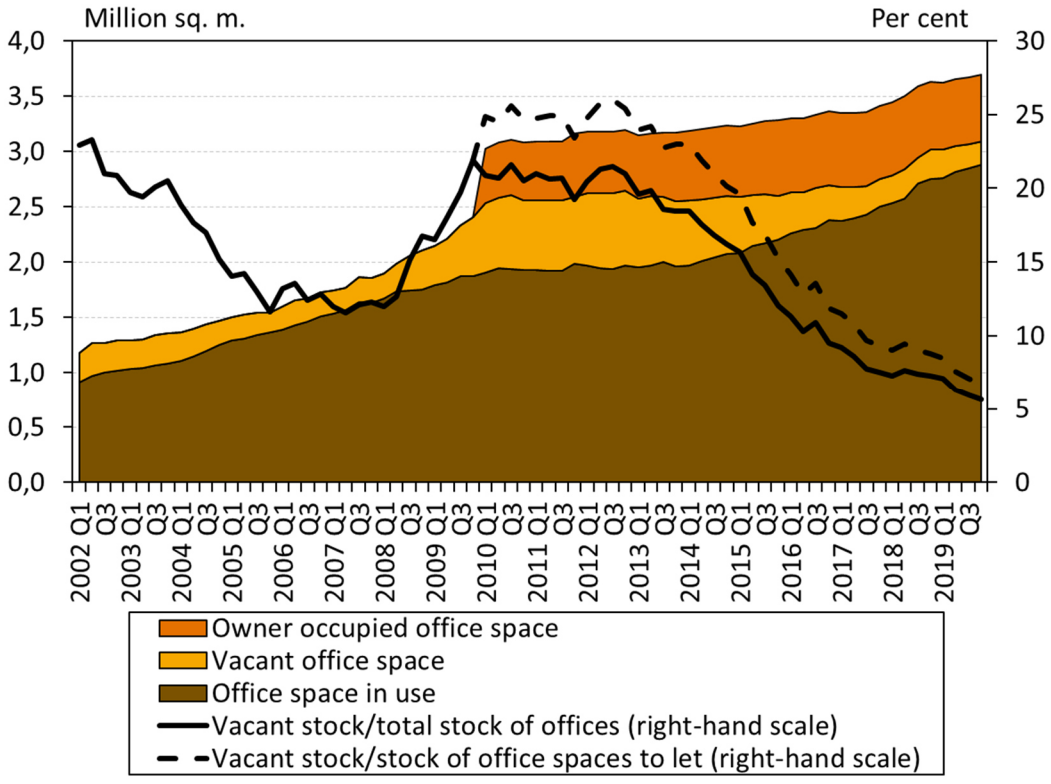
[1] Source: https://www.mnb.hu/letoltes/commercial-real-estate-market-report-april-2020.pdf

Office Rental Market

Floor space and vacancy rates of modern offices in Budapest

After seven years of steady decline, the vacancy rate of the Budapest office market dropped to 5.6 per cent at the end of 2019. At the end of last year, the modern Budapest office stock totalled 3.69 million square metres: of this, 3.09 million square metres (approximately 84 per cent) was space to let and 0.6 million square metres was owner occupied space. Similarly to the vacancy trends seen in the last four years, the end-of-year 5.6 per cent vacancy rate in Budapest represented an all-time low.

The vacancy rate fell by 1.7 percentage points in 2019, and by 0.3 percentage point in Q4. The decline in the vacancy rate was due to robust rental demand, as well as the low volume of new completions. Office space to let within the total Budapest office stock had a vacancy rate of 6.7 per cent at the end of 2019.

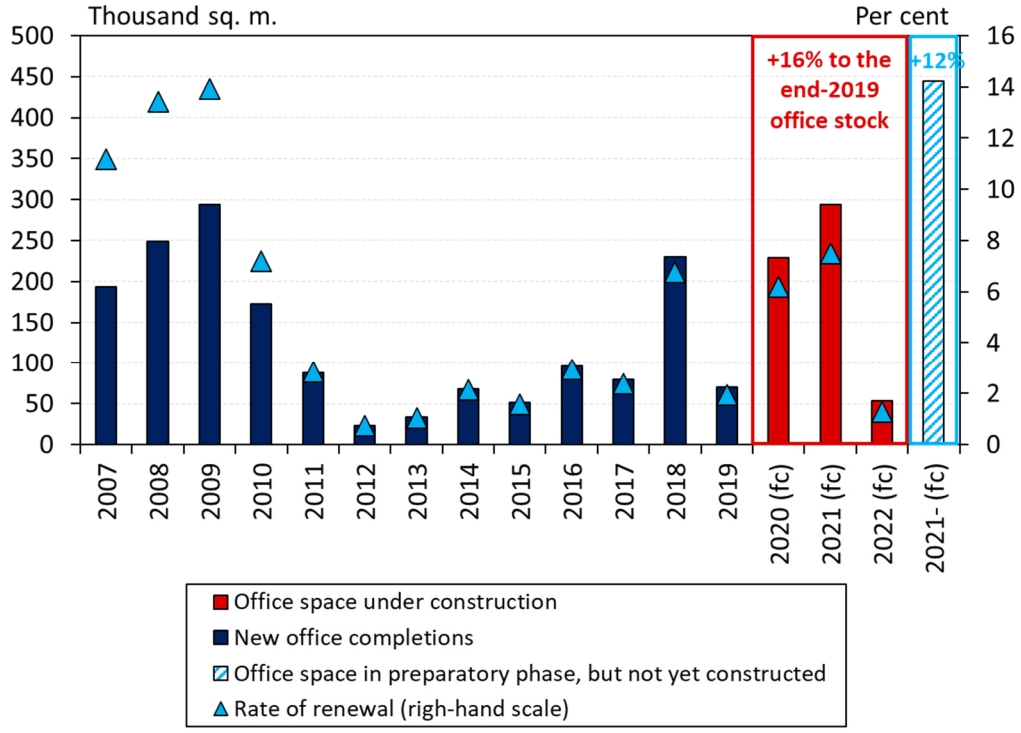


As can be seen in the figure above, the vacancy rate for office space has fallen to one-fifth since 2010, a trend highlighted by experts interviewed in connection with the proliferation of green ratings.

Development activity in the Budapest office market

In 2019, the volume of new office completions was extremely low, but significant growth is planned going forward. In 2018, the volume of new office completions was quite high (231,000 square metres), with only 71,000 square metres of new office space (8 office blocks) completed in Budapest in 2019. Looking ahead, however, more than 200,000 square metres of new office space is planned for each of the next two years: 229,000 square metres for 2020, and 294,000 square metres for 2021. The Budapest office market continues to be characterised by strong

development activity. At the end of 2019, almost 576,000 square metres of office space was under construction, up 20 per cent from the end of 2018. These office buildings under construction will appear on the market as new supply in the next 2-3 years, expanding the end-2019 stock of modern offices in Budapest by 16 per cent overall. Prelease contracts cover 56 per cent of new completions due in 2020 and 53 per cent due in 2021. With the start of new developments and the possible late completion of current construction work, the volume of completions in 2021 and 2022 will likely increase in the next quarters. The total floor space of the developments that can be potentially launched in a short time but are currently not under construction in Budapest is 444,000 square metres, accounting for 12 per cent of the existing stock of offices at the end of 2019. Some of these projects may be completed in 2021 the earliest, but looking ahead, the stock of modern offices in Budapest could expand by 28 per cent in the next 4-5 years.

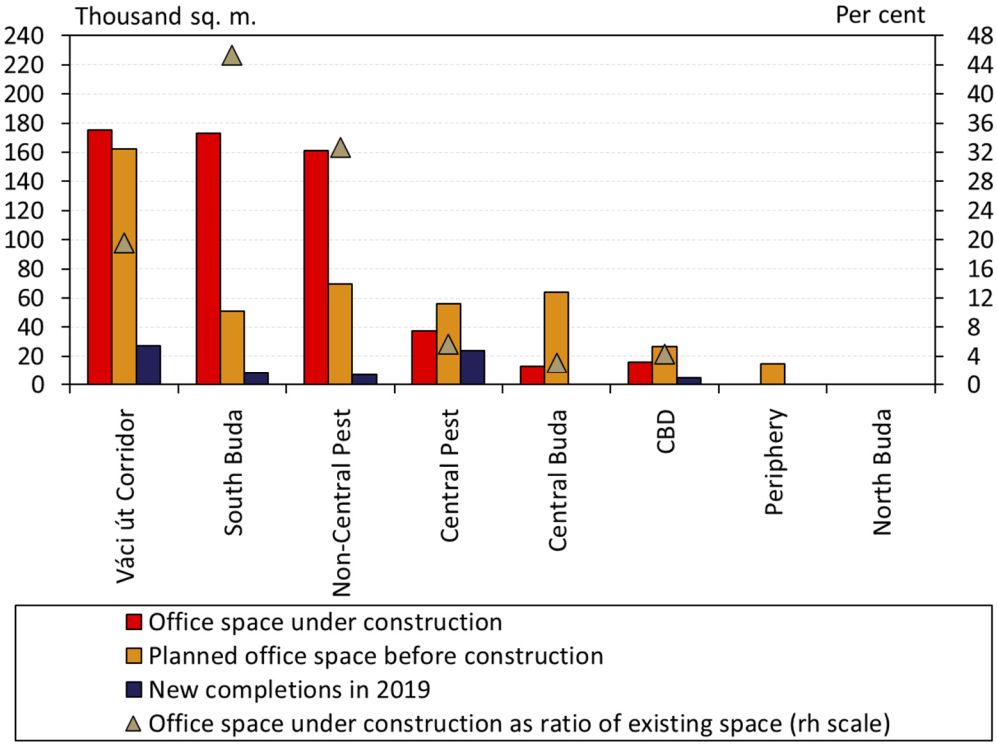


Almost half (46 per cent) of the developments under construction that are due to be delivered in 2019 were delayed in the past year. At the end of 2018, 121,000 square metres of office space was under construction, with expected completion in 2019 (Chart 13). At the end of 2019, however, only 71,000 square metres of new office space was delivered, i.e. 58 per cent of the previously planned volume. In the meantime, a newly launched refurbishment on a lesser scale (5,000 square metres in total) contributed to the volume of new completions in that year. Projects delayed from 2019 (55,000 square metres in total) are expected to enter the market in 2020. In the past year, 46 per cent of the completions planned for 2019 were delayed until the next year.

Distribution of Budapest office developments; renewal rate and new completions by sub-market

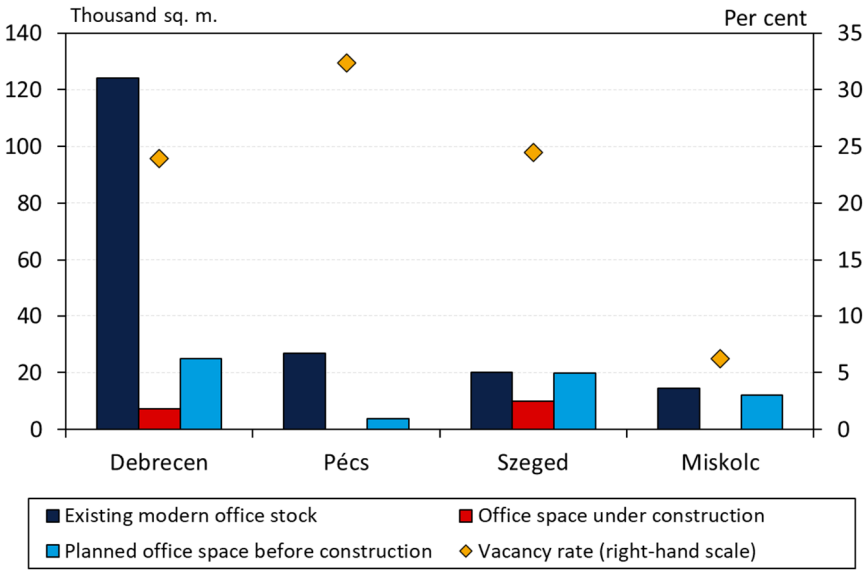
In 2019, the majority of new developments were launched in the Non-Central Pest, the Váci út Corridor and the South Buda sub-markets,4 the primary locations of current office developments in Budapest. In 2019, most new completions were divided between the Váci út Corridor (27,000 square metres) and the Central Pest (24,000 square metres) submarkets,

contributing to the annual volume by 38 and 34 per cent, respectively (Chart 14). 24 per cent of all modern office space (899,000 square metres) in Budapest is concentrated on the Váci út Corridor, and the volume of new office construction (175,000 square metres) is currently the largest here. Furthermore, most of the projects in the pipeline will be completed here. Large-scale office development is also under way in Non-Central Pest (173,000 square metres) and the South Buda sub-market (161,000 square metres). The renewal rate calculated as the ratio of office space under construction and existing office stock will be exceptional in the next 2-3 years in the South Buda and the Non-Central Pest sub-markets (45 per cent and 33 per cent, respectively).



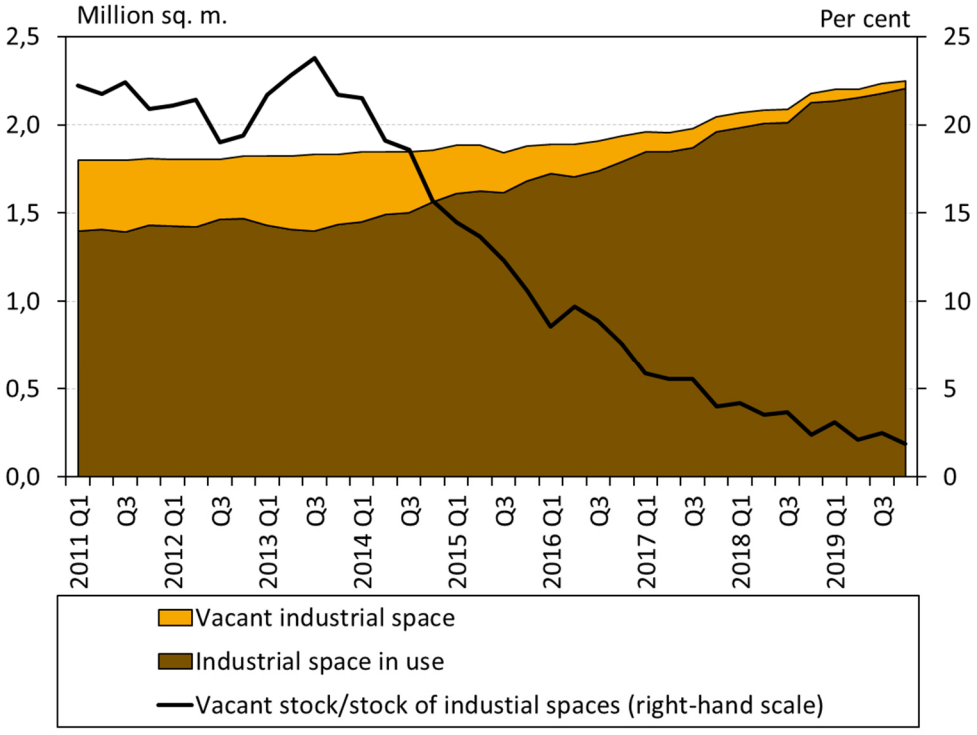
Modern office stock for lease outside Budapest

Modern rental offices outside Budapest represent a total area of approximately 185,000 square metres concentrated in four county seats. New completions took place in Szeged in 2017 and in Debrecen in 2018, but none in 2019. Of the examined locations Debrecen has the largest modern rental office stock, totalling 124,000 square metres (Chart 18). By comparison, Pécs, Szeged and Miskolc have significantly smaller stocks (between 14,000 and 27,000 square metres). The vacancy rate is highest in Pécs, with almost one-third of the offices unoccupied. The vacancy rates in Szeged, Debrecen and Miskolc are 25, 24 and 6 per cent, respectively. Looking ahead, office constructions are under way in both Debrecen and Szeged; planned projects awaiting rental demand are typical in all four locations. In recent years several companies, mostly SSCs moved into premises outside Budapest, but according to Board members, rural cities would need significantly more medium-sized or larger companies for the emergence of a more mature office market as regards development, rental and investment.



Rental market for industrial-logistics properties

The Budapest agglomeration had practically no industrial-logistics space available for lease at the end of the year. At the end of 2019, the stock of modern industrial-logistics properties in Budapest and its agglomeration monitored by the Budapest Research Forum amounted to 2.25 million square metres. Of this total stock, 90.5 per cent is located in industrial-logistics parks, while the remaining 9.5 per cent situated in smaller, urban logistics properties. The vacancy rate in the segment fell to 1.9 per cent by the end of 2019, marking a1.5-percentage point decrease versus the previous year-end data and ahistoric low.



3.3. Professional views on the LEED and BREEAM certifications

Real estate developer and operator considerations

In order to test the hypothesis, in addition to BSZL's own development and operation experience, it was important to get to know the experience of an actor in the office market with a similar profile, thus, we asked Csaba Zeley, the asset management director of ConvergenCE Hungary, to share their decades of real estate development experience, which they gained primarily in the commercial and office real estate market.

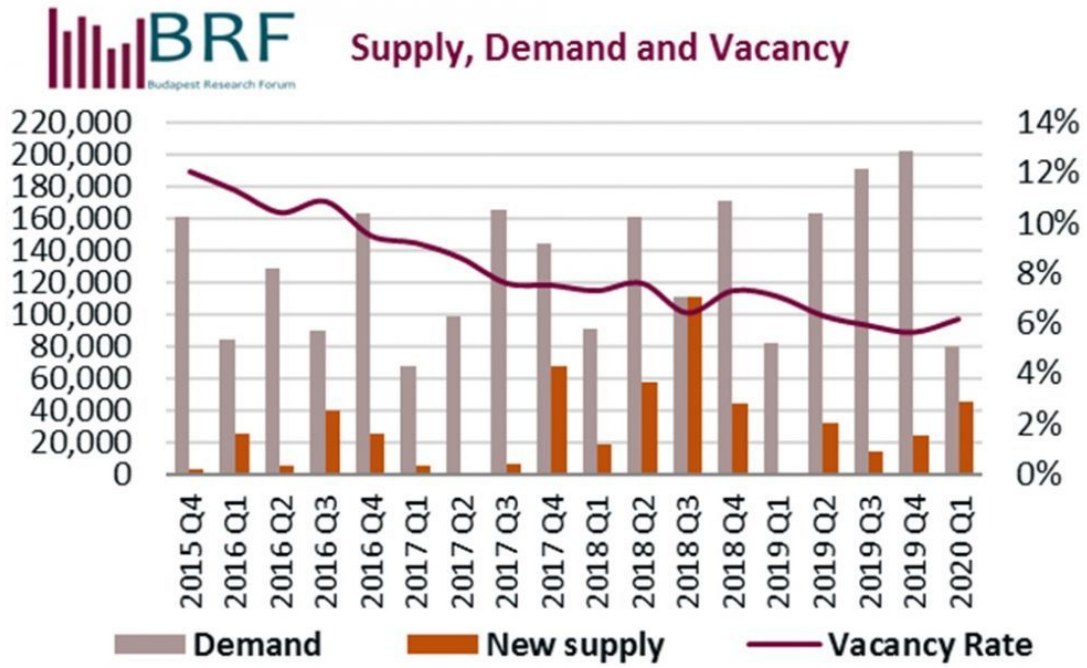
Below we summarize these findings and experiences.

According to the interviewed expert, the development of the Hungarian office building market can be divided into two major eras and characteristics. On the one hand, there is the real estate portfolio that existed for several decades, meaning the buildings built before 2010; and on the other hand, the modern, typically "A" category office buildings and commercial properties, the development of which started after 2010. The buildings of the first period are characterized by such architectural and technical solutions that a vast majority of which are now obsolete, while modern developments are generally of a higher technical standard. At the same time, sustainability and environmental considerations have come to the fore, as evidenced by green certifications.

Today, it is almost unimaginable to develop an office building without planning, constructing and accrediting the new properties in a green certification system.

He emphasized that it is not only possible to obtain certifications for newly built properties, but also, as the case of the Eiffel office building shows, even after the renovation of existing properties have taken place. This required the new UK owner introducing this approach, as obtaining the certification was important to him.

Hence, with that, we came to one of the most important findings, namely that the lack of certification is a competitive disadvantage in the market. However, for that to happen, according to the expert, there must be an important phenomenon present, namely the relatively high vacancy rate. 'Relatively' is an important word, as trends show that this indicator has still improved significantly in the market, meaning that demand in excess of the volume of new developments has been typical in recent years, as the figure below shows:



According to the office market expert, mainly this phenomenon explains why obtaining certifications has become an increasingly important and then unavoidable factor in the office market. That is, tenants can choose from a relatively wide portfolio in the office market despite the narrowing of supply, while the vacancy rate in the industrial real estate market is below 2%, meaning having a green certification does not necessarily constitute as such an advantage.

The view is therefore that in the field of industrial real estate, the appreciation of certifications may start if the supply expands significantly, so that the settling companies, especially multinational companies with a strong environmental commitment, set higher expectations in this area for their rental properties.

Regarding the levels of certifications it can be said that while developers and tenants have previously accepted lower grades of the rating systems, in the past 2-3 years buildings with the highest rates have also started to appear, which may continue as a trend in the future.

He emphasized that in order to achieve the lower grades of the ratings, no significant additional costs are required during the development; it is sufficient to take into account the environmental aspects required by the methodologies during the planning. Domestic building regulations for new properties are quite strict, so these requirements can be met with little extra energy. Of course, achieving higher grades requires more effort.

From a financial point of view, it is not the additional income from rents or the significant reduction in operating costs that result in a higher profit, but the fact that the rental period of certified properties may be shorter than that of non-certified properties, which already means significant financial benefits for developers.

Overall, the proliferation of green certifications in the office real estate market is expected to emerge in the industrial real estate market as well. However, it does not predict a significant improvement in the next 5-10 years without major incentive interventions.

Green certifications through the eyes of a consultant

It is not possible to get a comprehensive picture of the market for green certifications without asking the actor who plays the most important role in documenting the process and providing insight into the design and implementation in order to obtain the certifications.

In order for someone to be able to issue these certifications, they must meet strict professional requirements in every respective certification, thus this segment is quite narrow in Hungary, with only a few dozen players present. We asked two directors of one of these companies, (Greenbors Consulting) Zsombor Barta and Gábor Szarvas, to share their experiences, to present the course of the assessments and the expected trends.

During the interview, in addition to the characteristics found earlier, the experts mentioned several new aspects that draw attention to the importance of green certifications. One of these is that in most large-scale developments, investors (also) put some form of bank financing into projects when they are not fully self-financing. Here, a market behavior can be observed in that banks favor investments that plan on obtaining green certifications in terms of funding, they can even set as a condition that they support only such projects. Elsewhere, with a similar logic, green investments receive certain conditional reliefs and discounts. This is definitely worth considering, especially if financers will more widely expect it from investors.

They have also mentioned a best practice that may even be suitable for wider application: that, which the District 13th applies for investments. The essence of the allowance provided by the district is that investments with a green certification (ie targeting it) receive an easement on site coverage regulations if they meet the conditions. This is an extremely good incentive for investors in crowded locations, as the higher built-in square footage also provides direct economic benefits. Experts consider this initiative to be extendable to the entire territory of Budapest, encouraging investors to take environmental considerations into account at a high level already in the planning phase of projects.

Another incentive could be the practice of the United States, for example, of providing easements for newly built properties that are certified or are in the process of obtaining a certification during property licensing procedures. Simplified and thus faster licensing procedures are particularly important to investors, as they will be able to hand over the properties to their tenants sooner, meaning the investment will start to generate revenue for them sooner.

In presenting the characteristics of industrial properties, the experts classified them into two basic functional groups, ie, we distinguish between properties for logistics purposes and properties that accommodate production functions. The distinction is also important because the spread of certifications is expected to be different in the two segments.

Properties for logistics purposes, which typically mean warehouse buildings with some technology, are characterized by the fact that a significant part of their energy consumption is accounted for by the operation of the building and the servicing of its machinery.

Another important feature is that their design and construction time is much shorter, so the certification process, which is usually implemented in 2 stages, can be performed in one step.

A common feature of certification procedures is that they consist of a fixed certification fee to be paid to the issuer of the certificates, in addition to which there is the fee for the certification consultant. In the case of a BREEAM certification, the procedural fee for an average-sized warehouse is about 5,000 Euros, while the LEED certification for the same

building is about 6,000 Euros, so the procedural fees of the two most used certification systems do not represent a significant amount compared to the volume of the development, not even when including consultancy fees.

Conclusion of the analysis in brief:

Our interviewees clearly confirmed our assumption that following the office market, albeit with a delay of several years, green certifications will clearly appear as the required minimum for investors.

The unanimous view of the experts was that the green certification of offices could be followed first by the buildings for logistics purposes, maybe even with a major breakthrough in the next 5-10 years, and later by the production halls.

Factors currently contributing to the green certification:

- some global companies already have internal environmental regulations, possibly their own climate target (eg climate neutrality by 2030), so they prefer to choose a green certified building
- bank financing may be easier to acquire if the certificate is obtained
- there are specific allowances from the regulatory side (13th district easements)

Inhibiting factors:

- the high vacancy rate of 25% in the office market in the 2010s created a competitive situation that required a differentiated strategy (eg development of quality A + offices and environmental measures such as obtaining a green certification). The vacancy rate in the industrial real estate market is currently below 2%, so other conditions (location, transport, etc.) are more important to tenants than having a green certification.
- not everywhere do regulations promote the spread of certifications

In conclusion it can be stated that while the obsolescence of offices is much faster (comprehensive renovation is required every 5-10 years), the technical quality of industrial properties deteriorates more slowly over time, so this cycle can be 20-30 years. Accordingly, it may be worthwhile for industrial real estate investors to get involved in the green certification process without immediate, economic benefits, as it can be a major competitive advantage in the long run.

3.4. What is a BREEAM rating?

BREEAM is an international scheme that provides independent third party certification of the assessment of the sustainability performance of individual buildings, communities and infrastructure projects. The BREEAM assessment tool was developed by the Building Research Establishment, and launched in 1990 to help reduces the harmful impacts of building development on the environment. BREEAM has since been a key force in the drive for greater built environment sustainability in the UK and elsewhere, and is now the most widely used environmental assessment method for buildings, infrastructure and communities in the world.[2]

[2] Source: https://www.bregroup.com/about-us/our-history/timeline/

3.4.1. About Building Research Establishment (BRE)[3]

The Building Research Establishment (BRE) is a centre of building science in the United Kingdom, owned by charitable organisation the BRE Trust. It is a former UK government national laboratory that was privatised in 1997. BRE provides research, advice, training, testing, certification and standards for both public and private sector organisations in the UK and abroad. It has its headquarters in Garston, Hertfordshire, England, with regional sites in Glasgow, Swansea, the US, India, the Middle East and China.

Programmes

BRE is now funded with income from commissioned research, commercial programmes and by a number of digital tools for use in the construction sector.

BRE's certification arm – BRE Global – is an independent, third-party certification body responsible for sustainability certification schemes such as BREEAM (for buildings and communities), CEEQUAL (for infrastructure), the Home Quality Mark (for housing) and LPCB certification (for fire and security products and services).

BRE's training arm, the BRE Academy provides online and classroom courses on built environment related issues like sustainability, fire, resilience and building information modelling (BIM).

BRE also carries out research and data generation in support of national and international standards and building codes, including the UK building regulations. It also develops its own standards for responsible sourcing (BES 6001), and ethical labour sourcing (BES 6002).

BRE's digital tools include construction waste management tool SMARTWaste and construction health, safety and wellbeing tool YellowJacket. It also has UKAS accredited testing laboratories, and a publishing business in partnership with IHS Press called the BRE Bookshop.

Ownership

The Building Research Establishment is owned by the BRE Trust, a registered charity that works to support research and education in the built environment. All of the profits accrued by BRE are passed to the Trust and are used to fund new research and education programmes designed to meet the Trust's goal of promoting safety and sustainability.

Over the last 20+ years the BRE Trust has funded 117 PhDs on a total research programme of £15m, with other funding levered into the sector as a whole from research councils and European Union research sources.

The BRE Trust also financially supports five university Centres of Excellence. One of the first Centres established was at the University of Edinburgh in 2004, a research and education programme on fire safety engineering. The other centres are in Strathclyde (energy utilisation), Bath (construction materials), Cardiff (sustainable engineering), and Brasilia (integrated and sustainable communities).

History

1943 image of 1:50 Scale model of the Möhne Dam built for Operation Chastise (the Dambusters' Raid), Building Research Establishment BRE was founded in 1921 as the Building Research Board

[3] Source: https://en.wikipedia.org/wiki/Building_Research_Establishment

at East Acton as part of the British Civil Service, as an effort to improve the quality of housing in the United Kingdom.

During the Second World War, it was involved in the confidential research and development of the bouncing bomb for use against the Möhne Dam in the Dambusters Raid of 1943[6] A small scale model of the dam used for testing can still be found at the Centre in Garston, Watford, today.

BRE was a founding member in 1976 of BSRIA, the Building Services Research and Information Association and the UK Green Building Council (UKGBC) in 2007.

Having subsumed a number of other government organisations over the years, including the former Fire Research Station, and the Princes Risborough Laboratory, it was given executive agency status in 1990, before being privatised by the Department for Environment, Transport and the Regions on 19 March 1997.

From 1 January 2013, BRE took over the management of the UK and Ireland chapter of BuildingSMART.

In August 2016, Constructing Excellence merged with BRE, with BRE undertaking to maintain the CE's brands and functions.

3.4.2. About BREEAM4

BREEAM is the world's leading sustainability assessment method for masterplanning projects, infrastructure and buildings. It recognises and reflects the value in higher performing assets across the built environment lifecycle, from new construction to in-use and refurbishment.

BREEAM does this through third party certification of the assessment of an asset's environmental, social and economic sustainability performance, using standards developed by BRE. This means BREEAM rated developments are more sustainable environments that enhance the well-being of the people who live and work in them, help protect natural resources and make for more attractive property investments.

How the BREEAM Certification Works

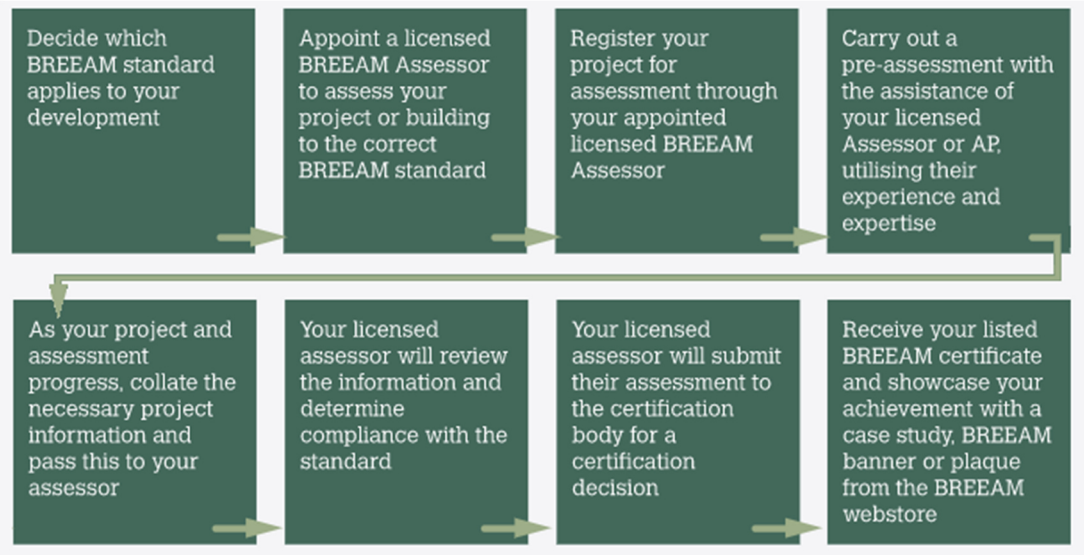
BREEAM is an international scheme that provides independent third party certification of the assessment of the sustainability performance of individual buildings, communities and infrastructure projects.

Assessment and certification can take place at a number of stages in the built environment life cycle, from design and construction through to operation and refurbishment.

In the case of BREEAM, third-party certification involves the checking – by impartial experts – of the assessment of a building or project by a qualified and licensed BREEAM Assessor to ensure that it meets the quality and performance standards of the scheme. At the heart of this process are certification bodies – organisations with government approval (through national accreditation bodies) to certificate products, systems and services.

[4] Source: https://www.breeam.com/

How to get a BREEAM rating



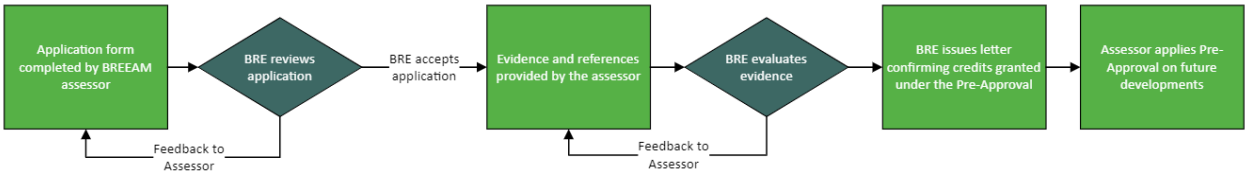
Pre-Approval Process5

Assessments carried out in accordance with BREEAM schemes rely on evidence to demonstrate compliance with the relevant requirements. This evidence usually relates only to a specific development (e.g. building, extension, refurbishment, etc). However, some clients use a standard design and specification across multiple builds.

In response to this, BRE Global set out to develop a process whereby these clients could have the relevant evidence assessed and audited once for future use on multiple projects. The BREEAM Pre-Approval process does just this, and as a result can save time and money.

How Does it Work?

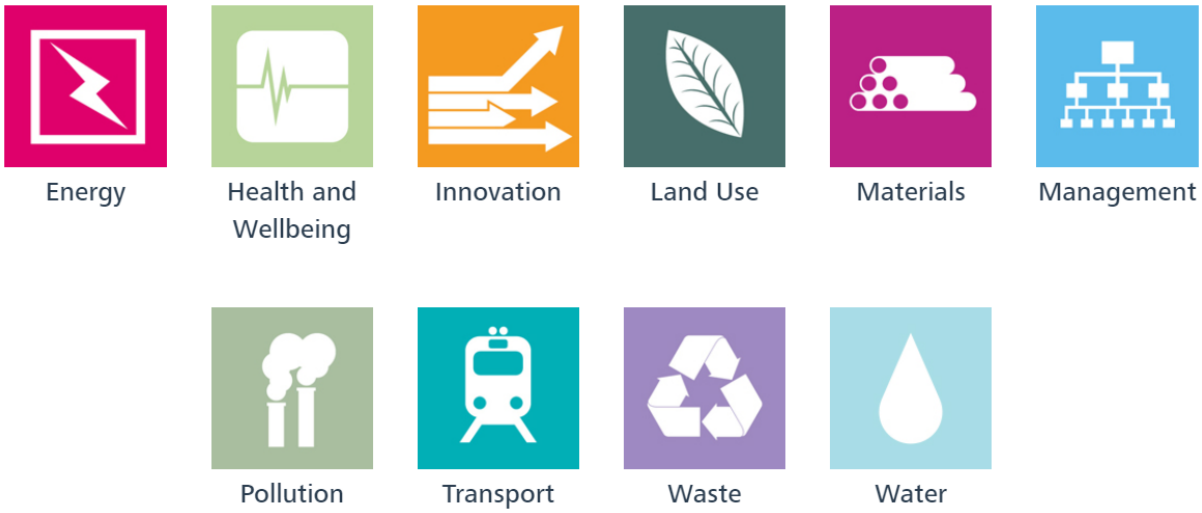
The first step in the process is for the client and licensed BREEAM Assessor to determine if BREEAM Pre-Approval is suitable for the assessments being undertaken. The Assessor will then make an application using the Acceptance form & instructions in GN45 below. After a review of this information, the Assessor is invited to provide evidence and references that confirm compliance with the relevant credit issues that are to be pre-approved. BRE Global then conduct a review of the evidence provided i.e. conduct a Quality Assurance (QA) audit. Once the proposed credits and their associated evidence has been audited and there are no non-conformances, a confirmation of the pre-approval will be issued. For the next three years, the pre-approved credits can be used in up to 100 BREEAM assessments, saving the client and Assessor time and money when assessing projects of a similar design and specification.



[5] Source: https://www.breeam.com/discover/how-breeam-certification-works/pre-approval/

BREEAM measures sustainable value in a series of categories, ranging from energy to ecology.

Each of these categories addresses the most influential factors, including low impact design and carbon emissions reduction; design durability and resilience; adaption to climate change; and ecological value and biodiversity protection.



Awarding BREEAM credits

Each category is sub-divided into a range of assessment issues, each with its own aim, target and benchmarks. When a target or benchmark is reached as determined by the BREEAM assessor, the development or asset score points are called credits. The category score is then calculated according to the number of credits achieved and its category weighting. Once the development has been fully assessed, the final performance rating is determined by the sum of the weighted category scores.

Results: BREEAM's performance rating and stars6

The main output from a certified BREEAM assessment is the rating. A certified rating reflects the performance achieved by a project and its stakeholders, as measured against the standard and its benchmarks.

The rating enables comparability between projects and provides reassurance to customers and users, in turn underpinning the quality and value of the asset.

The BREEAM ratings range from Acceptable (In-Use scheme only) to Pass, Good, Very Good, Excellent to Outstanding and it is reflected in a series of stars on the BREEAM certificate.

[6] Source: https://www.breeam.com/discover/how-breeam-certification-works/

BREEAM Assessors and BREEAM Accredited Professional in Hungary7

1. Company	2. Scheme	3. Assessor	4. Town/ Postcode/Country	5. National Scheme Operator (NSO)	6. Multiple Addresses
7. ABUD Engineering Ltd.	8. BREEAM Accredited Professional	9. Mr Andras Szollar	10. Budapest, 1082, Hungary	11. BRE Global	12.
13. ABUD Mernokiroda Kft.	14. BREEAM Accredited Professional	15. Ms Olga Peteri	16. 1139, Hungary	17. BRE Global	18.
19. ABUD Mernokiroda Kft.	20. BREEAM International New Construction BREEAM International Refurbishment & Fit-out BREEAM In-Use	21. Miss Adrienn Gelesz Ms Olga Peteri	22. Budapest, 1139, Hungary	23. BRE Global	24.
25. CBRE Hungary Kft	26. BREEAM International New Construction BREEAM In-Use	27. Mr Zsombor Barta	28. Budapest, 1055, Hungary	29. BRE Global	30.
31. Denkstatt Hungary Kft.	32. BREEAM International New Construction	33. Mr Andras Klopfer Mrs Borbala Cross-Boda	34. Budapest, 1037, Hungary	35. BRE Global	36.
37. DVM Group	38. BREEAM International New Construction BREEAM In-Use	39. Mr Tibor Massanyi Ms Edina Hornok Ms Zsuzsanna Gidro	40. Budapest, 1052, Hungary	41. BRE Global	42.
43. GAMMA Properties Kft.	44. BREEAM In-Use	45. Ms Agnes Kiss	46. Budapest, H-1093, Hungary	47. BRE Global	48.

[7] Source: https://tools.breeam.com/projects/explore/companies.jsp?assessorType=0&greenBookSchemeID=0&certNumbe=&companyName=&postcode=&assessorName=&location=&countryID=44&scale=7.5&Submit=Search

49. Greenbors Consulting Kft	50. BREEAM Accredited Professional	51. Mr Zsombor Barta	52. Budapest, na, Hungary	53. BRE Global	54.
55. Greenbors Consulting Kft	56. BREEAM International New Construction BREEAM In-Use	57. Miss Rita Varga Mr Zsombor Barta	58. Budapest, H-1037, Hungary	59. BRE Global	60.
61. Mertek Epiteszeti Studio Kft	62. BREEAM International New Construction BREEAM International Refurbishment & Fit-out	63. Mr Andras Szollar (Mertek Epiteszeti) Ms Eva Beleznay	64. Budapest, H-1082, Hungary	65. BRE Global	66.
67. ML2S Sustainable Solutions	68. BREEAM In-Use	69. Mr Janos Szlovak	70. Budapest, 1011, Hungary	71. BRE Global	72.
73. Obuda Ujlak ZRT	74. BREEAM Communities BREEAM International New Construction BREEAM International Refurbishment & Fit-out BREEAM In-Use	75. Mr Gabor Lipcsei Mr Nandor Kovacs	76. Budapest, 1033, Hungary	77. BRE Global	78.
79. Obuda-Ujlak Zrt.	80. BREEAM Accredited Professional	81. Nandor Kovacs Ms Mónika Egyed	82. H-1033, Hungary	83. BRE Global	84.
85. Realiscon Kft.	86. BREEAM International New Construction BREEAM International Refurbishment & Fit-out BREEAM In-Use	87. Miss Dora Plajer	88. Budapest, 1088, Hungary	89. BRE Global	90.

91. Tjaras Kft.	92. BREEAM In-Use	93. Mr Michael Smithing	94. Budapest, 1025, Hungary	95. BRE Global	96.
97. TOMLIN Kft	98. BREEAM International New Construction BREEAM In-Use	99. Zsombor Barta	100. Budapest, 1023, Hungary	101. BRE Global	102.

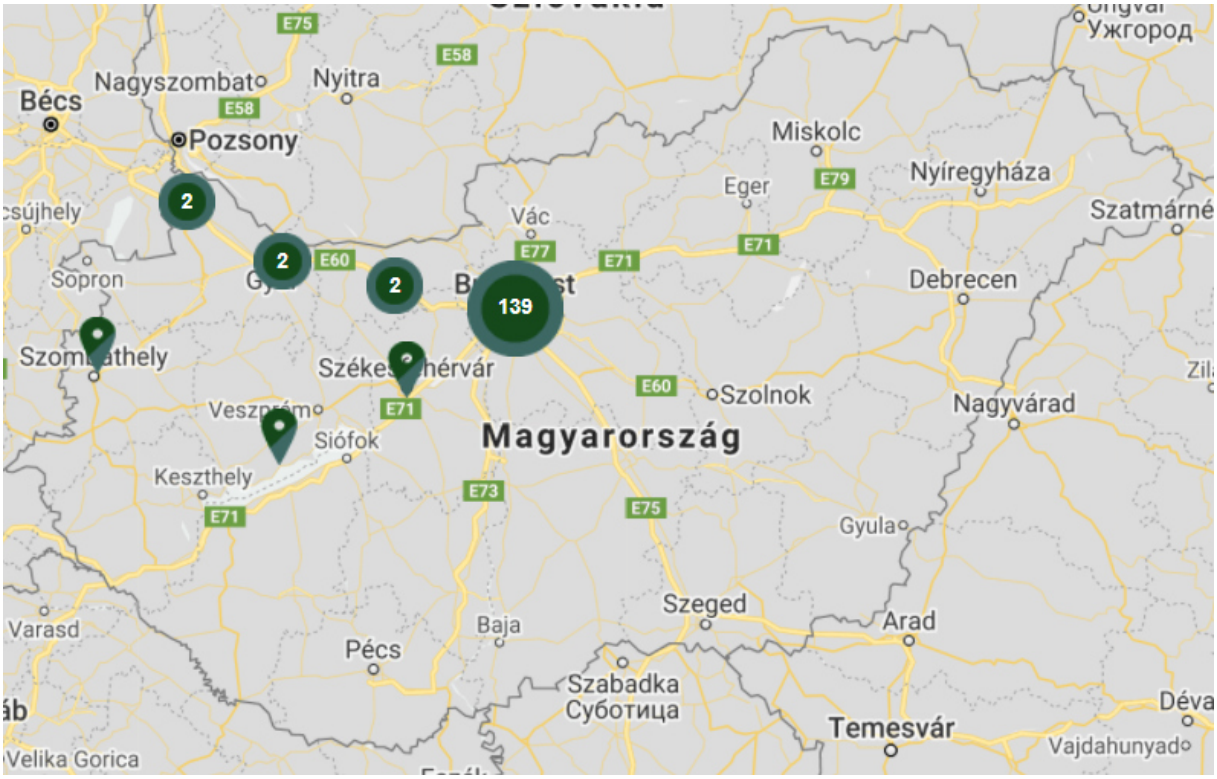


Figure: BREEAM Certified locations in Hungary[8]

This map shows most of the BREEAM Assessments that have been certified under BREEAM 2008 onwards - excepting a small number of buildings which cannot be listed for client confidentiality reasons. It also includes assessments certified by National Scheme Operators under BREEAM affiliated schemes.

In total, by September of 2020, 148 buildings/assets were certified in Hungary, mostly office buildings.

[8]Sorce:https://tools.breeam.com/projects/explore/map.jsp?sectionid=0&projectType=&rating=&certNo=&buildingName=&client=&developer=&certBody=&assessor=&addressPostcode=&countryId=44&partid=10023&Submit=Search

3.5. What is a LEED rating?

3.5.1. About USGBC and LEED

In April 1993, Rick Fedrizzi, David Gottfried and Mike Italiano convened representatives from 60 firms and severayahl nonprofits in the American Institute of Architects' boardroom for the founding meeting. It was then that ideas were shared for an open and balanced coalition spanning the entire building industry and for a green building rating system, which would later become LEED.

The 1990s saw a growing realization of the need to optimize these systems—with people and nature in mind—to create better buildings.

LEED's development grew from the formation of USGBC in 1993 by three individuals: David Gottfried, Mike Italiano and Rick Fedrizzi, who served as president, CEO and founding chair of the organization.

By 1998, USGBC had successfully developed LEED 1.0, and it began pilot testing 19 projects.

Following the success of the pilot program, LEED for New Construction saw a public launch in March 2000.

In March 2001, drawing on lessons learned from the pilot program, USGBC launched LEED 2.0.

Furthering its movement into new market sectors, USGBC saw the first elementary school achieve LEED Gold, Third Creek Elementary in Statesville, N.C., in November 2002. Meanwhile, as a reflection of the excitement and demand within the green building industry, USGBC hosted the first-ever Greenbuild International Conference and Expo that same month in Austin, Texas, with approximately 4,000 attendees.

2003 saw a number of significant developments for LEED. USGBC had grown and matured from its start as a fledgling non-profit, gathering strength, staff and resources, and it had launched LEED v2.1 the previous year. In April, LEED for Existing Buildings and LEED for Commercial Interiors both began pilot testing, while in October, LEED for Core and Shell launched. In November, the National Geographic Society building in Washington, D.C, became the first LEED-certified existing building.

In April 2004, LEED reached a significant milestone: 100 certified projects.

USGBC launched LEED v2009 in April 2009. Among the many improvements over its predecessor, LEED v2.2, LEED v2009 introduced weightings for credits based on the Environmental Protection Agency's TRACI (Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts) and weightings developed by the National Institute of Standards. This advancement made LEED much more rigorous and indicated which credits were most important. For the first time there were objective scientific intentions behind the assigned credit values.

That same year, USGBC moved into its new headquarters at 2101 L St. NW, a Platinum-certified LEED for Commercial Interiors space, the first project to certify under LEED v2009 and a showcase of sustainable interior design. In 2010, GBCI certified the 5000th LEED project.

LEED v4 came in 2015 with a lot of new improvements over the previous systems, including increased flexibility, a performance-based, smart grid approach, an emphasis on materials and resources, a comprehensive approach to water, and streamlined documentation. LEED v4 continued to raise the bar for green buildings.

LEED v4.1 is for all – it is more inclusive with updated referenced standards and allows projects to earn LEED points through building performance monitoring. It also continues to drive performance, fully integrating performance outcomes supported by new methodologies and a simple data-driven path to measure performance on an ongoing basis. Lessons learned from those using LEED have led us to take a deeper look at existing buildings, residential projects and cities to develop solutions that address unique markets.

Living Standard is about connecting green buildings and LEED, and connecting our products to people. Through this campaign, we aim to listen to our communities, share their stories, and build a vision for a more sustainable future for all by making visible the tangible and positive impacts that green buildings and green communities have on our lives.

USGBC created LEED to measure and define what green building meant, and to provide a roadmap for developing sustainable buildings. With LEED, they established a baseline—a universally agreed upon holistic system for reducing environmental impact.

How does it Work?9

Leaders across the globe have made LEED the most widely used green building rating system in the world with 1.85 million square feet of construction space certifying every day. LEED certification provides independent verification of a building or neighborhood's green features, allowing for the design, construction, operations and maintenance of resource-efficient, high-performing, healthy, cost-effective buildings. LEED is the triple bottom line in action, benefiting people, planet and profit.

LEED is pushing the green building industry to go further. Developed in a transparent, consensus-based process that includes several rounds of public comments and approval from USGBC members, LEED ensures that leaders can demand more from our buildings, creating healthy experiences, conserving precious resources and benefitting the business bottom line.

LEED projects earn points across nine basic areas that address key aspects of green buildings.

- Integrative process
- Location and transportation
- Sustainable sites
- Water efficiency
- Energy and atmosphere
- Materials and resources
- Indoor environmental quality
- Innovation
- Regional priority

Based on the number of points achieved, a project earns one of four LEED rating levels:

[9] Source: http://leed.usgbc.org/leed.html

The LEED rating systems:

LEED works for all buildings at all phases of development, from new construction to existing buildings, as well as all building sectors, from homes to hospitals to corporate headquarters.

Steps to certification:

Bringing a project through the rigorous LEED certification process is meant to challenge project teams and inspire them to seek outside-the-box solutions. We strive to make our customer experience easy by providing you with award-winning customer support as you move through the steps to certification:

REGISTER »

Register your project by submitting key information.

SUBMIT »

Submit your completed, comprehensive certification application through LEED Online and pay a certification review fee.

REVIEW »

Your LEED application is reviewed by GBCI, a third-party organization.

CERTIFY »

Certify your project and measure its performance

3.5.2. About WGBC10

In 1993, the first Green Building Council was founded – and a global movement was born. The US Green Building Council was formed by Rick Fedrizzi, David Gottfried and Mike Italiano with a mission to promote sustainability-focused practices in the building and construction industry, and for the first time, brought together the industry across the value chain to advance green building. Around the world, other green leaders in the industry looked to the impact of the USGBC and decided that they too needed to start a similar movement in their own country, led by a Green Building Council.

The green building movement began generating more and more interest around the world, and individuals from across the globe were supported by the USGBC. With this growing global interest, David Gottfried seeded and managed the formation of the "United Nations of the

[10] Source: https://www.worldgbc.org/our-story

Green Building Councils" with the mission of supporting the development of Green Building Councils around the world, as well as to unite them with a common voice and purpose.

And so began the World Green Building Council.

In 1999, the founding meeting of WorldGBC was held in California, US and three years later in 2002, WorldGBC was officially formed with Green Building Councils: Australia, Brazil, Canada, India, Japan, Mexico, Spain, and USA.

In 2007, a Secretariat for WorldGBC was formally established in Toronto, Canada, and vital support was provided by the Toronto and Region Conservation Authority (TRCA). Essential start-up funding of over $1 million dollars per year for 3 years was provided by the Province of Ontario Canada.

Since then, WorldGBC has seen tremendous growth and evolution in its focus and structure. In 2009, WorldGBC launched five Regional Networks and three membership levels (Prospective, Emerging and Established) to facilitate the growing interest in membership globally. In 2010 a Corporate Advisory Board was formed to deliver strategic insight directly from the industry to the WorldGBC Board. By 2012, the number of member Green Building Councils had grown from 9 to 71.

The WorldGBC began to play a more globally influential role by producing highly respected reports such as From Thousands to Billions - Coordinated Action Towards 100% Net Zero Carbon Buildings By 2050 in 2017 and Doing Right by Planet and People: The Business Case for Health and Wellbeing in Green Building in 2018.

In 2015, the WorldGBC Board agreed a three year strategy for the organisation with five key areas of focus: Membership; Regional Networks; Projects and Partnerships; Marketing, Communications and Influence; and Governance and Operations.

Since its formation, WorldGBC has grown into a global network of around 70 Green Building Councils around the world. It currently has a team located primarily in two offices in London, UK, and Toronto, Canada.

3.5.3. About HuGBC -the Hungary Green Building Council [11]

Mission

The Hungarian Green Building Council (HuGBC for short) was founded in 2009. Our architects, engineers, real estate developers, building material manufacturers, property managers, mechanics, economic professionals, companies and organizations operating in various fields of the construction industry are formed as a non-profit, national professional and social cooperation in the form of an association. It has set itself the goal of contributing to the spread of environmentally responsible and profitable construction practices in Hungary by promoting the necessary market, educational and legislative conditions.

Main activities

They participate in the professional development of architectural regulations that promote environmentally conscious and sustainable construction, as well as in the enforcement of environmental awareness with due weight.

[11] Source: https://www.hugbc.hu/egyesulet/bemutatkozas

They carry out professional communication and social communication on the topic of green building.

They pass on the knowledge, experience and innovative practices of their members to those interested in further trainings, conferences and workshops.

They contribute to the introduction and dissemination of green rating systems (LEED, BREEAM, DGNB) and to the training of professionals.

They are in close contact with higher education institutions to introduce new technologies.

They are a recognized developing **member organization of the international World Green Building Council**, so they also rely on international experience. They bring cutting-edge strategic principles, methodology and practices to Hungary.

Qualified Hungarian Buildings Database

The database prepared by the experts of the Hungarian Environmentally Conscious Construction Association (HuGBC) gives a comprehensive picture of Hungarian buildings with environmentally conscious certification. According to the hopes of the compilers of the Database, the representatives of the profession, the media and the general public will receive up-to-date information about the Hungarian results in the field.

Environmentally conscious building rating systems have already been developed in many countries around the world. Certification schemes are voluntary schemes that make certified establishments transparent and comparable at international level. The best known systems are the Building Research Establishment Environmental Assessment Method (BREEAM) from the United Kingdom and the LEED (Leadership in Energy and Environmental Design) green building certification system in the United States. In addition to these two Anglo-Saxon systems in our region, it is important to highlight the system developed by the German DGNB (Deutsche Gesellschaft für Nachhaltiges Bauen) as well as buildings certified under the European Union's Green Building Program.

In the Database of Qualified Hungarian Buildings, HuGBC continuously and up-to-date makes the ratings of Hungarian buildings in these systems available.

3.5.4. LEED Certified Buildings in Hungary12

Newly built property ratings

(BD+C New Construction & Core and Shell)

Name of the property	Certification type	Valid	Result
BD Bioscience Környe	LEED BD+C: Core and Shell v3 - LEED 2009	The rating has no expiration date.	SILVER
BSZL C1 logistics warehouse and office	LEED BD+C: New Construction v3 - LEED 2009	The rating has no expiration date.	SILVER
BSZL E2 logistics warehouse and office	LEED BD+C: New Construction v3 - LEED 2009	The rating has no expiration date.	SILVER
Ecodome	LEED BD+C: Core and Shell v3 - LEED 2009	The rating has no expiration date.	PLATINUM
Eiffel Palace Office Building	LEED BD+C: New Construction v3 - LEED 2009	The rating has no expiration date.	GOLD
FAM-2 Expansion Project Csömör	LEED BD+C: New Construction v3 - LEED 2009	The rating has no expiration date.	SILVER
Forest Offices Debrecen	LEED BD+C: Core and Shell (v4)	The rating has no expiration date.	GOLD
Four Points by Sheraton	LEED BD+C: Core and Shell v3 - LEED 2009	The rating has no expiration date.	CERTIFIED
Green House	LEED BD+C: Core and Shell v3 - LEED 2009	The rating has no expiration date.	PLATINUM
Green Pearl Baby Care Site	LEED BD+C: New Construction v3 - LEED 2009	The rating has no expiration date.	SILVER
GTC White House	LEED BD+C: Core and Shell v3 - LEED 2009	The rating has no expiration date.	PLATINUM
Henkel Ipari ingatlan Kőrösladány	LEED BD+C: New Construction v3 - LEED 2009	The rating has no expiration date.	SILVER
Hill Side Offices	LEED BD+C: Core and Shell v3 - LEED 2009	The rating has no expiration date.	GOLD
Infopark E	LEED BD+C: Core and Shell v3 - LEED 2009	The rating has no expiration date.	SILVER
Mill Park Offices	LEED BD+C: Core and Shell v3 - LEED 2009	The rating has no expiration date.	GOLD
Millennium City Center Building H	LEED BD+C: Core and Shell v2 - LEED 2.0	The rating has no expiration date.	GOLD

[12] Source: https://www.hugbc.hu/minositett-epuletek-adatbazis

MTK uj Hidegkuti Nandor Stadion	LEED BD+C: New Construction v3 - LEED 2009	The rating has no expiration date.	SILVER
NI Hungary Building C	LEED BD+C: New Construction v3 - LEED 2009	The rating has no expiration date.	GOLD
NI Hungary Building D	LEED BD+C: Core and Shell v3 - LEED 2009	The rating has no expiration date.	GOLD
Nordic Light Offices Building A	LEED BD+C: Core and Shell v3 - LEED 2009	The rating has no expiration date.	GOLD
Nordic Light Offices Building B	LEED BD+C: Core and Shell v3 - LEED 2009	The rating has no expiration date.	GOLD
P&G ASTER GYG	LEED BD+C: New Construction v3 - LEED 2009	The rating has no expiration date.	SILVER
Promenade Gardens Office Buildings	LEED BD+C: New Construction v3 - LEED 2009	The rating has no expiration date.	GOLD
Szabadság tér properties	LEED BD+C: New Construction v3 - LEED 2009	The rating has no expiration date.	SILVER
TriGranit Hungary - K&H HQ Budapest	LEED BD+C: New Construction v2 - LEED 2.2	The rating has no expiration date.	GOLD

Interior design ratings for buildings

(ID+C Commercial Interiors)

Name of the property	Certification type	Valid	Result
Avis Budget Group BSC	LEED ID+C: Commercial Interiors v3 - LEED 2009	The rating has no expiration date.	GOLD
Bank Center Management Office	LEED ID+C: Commercial Interiors v3 - LEED 2009	The rating has no expiration date.	SILVER
BD Tatabánya SAIS extension	LEED ID+C: Commercial Interiors v3 - LEED 2009	The rating has no expiration date.	SILVER
Bloomberg Budapest Roosevelt 7/8 Office	LEED ID+C: Commercial Interiors v3 - LEED 2009	The rating has no expiration date.	PLATINUM
Citibank Arena Corner	LEED ID+C: Commercial Interiors v3 - LEED 2009	The rating has no expiration date.	PLATINUM
Citibank Arena Corner Floor 1	LEED ID+C: Commercial Interiors v3 - LEED 2009	The rating has no expiration date.	GOLD
Citibank Arena Corner Floor 3	LEED ID+C: Commercial Interiors v3 - LEED 2009	The rating has no expiration date.	PLATINUM
Citibank Arena Corner Floor 3 phase II	LEED ID+C: Commercial Interiors v3 - LEED 2009	The rating has no expiration date.	PLATINUM
Citibank Arena Corner Fusion Center	LEED ID+C: Commercial Interiors v3 - LEED 2009	The rating has no expiration date.	GOLD
Citibank Arena Corner Ground Floor	LEED ID+C: Commercial Interiors v3 - LEED 2009	The rating has no expiration date.	PLATINUM
Citibank Arena Corner Phase VI	LEED ID+C: Commercial Interiors v3 - LEED 2009	The rating has no expiration date.	PLATINUM
Colliers International Hungary	LEED ID+C: Commercial Interiors v3 - LEED 2009	The rating has no expiration date.	SILVER
Deloitte Hungary	LEED ID+C: Commercial Interiors v3 - LEED 2009	The rating has no expiration date.	GOLD
DVM group Office	LEED ID+C: Commercial Interiors v3 - LEED 2009	The rating has no expiration date.	GOLD
Green House - Skanska Property Hungary Office	LEED ID+C: Commercial Interiors v3 - LEED 2009	The rating has no expiration date.	PLATINUM
ING Insurances and ING Bank premises	LEED ID+C: Commercial Interiors v3 - LEED 2009	The rating has no expiration date.	GOLD
Mozata Cafe & Bistro	LEED ID+C: Retail v4 - LEED v4	The rating has no expiration date.	GOLD
Skanska Property Hungary Office	LEED ID+C: Commercial Interiors v3 - LEED 2009	The rating has no expiration date.	GOLD

Ratings of existing buildings

(O+M: Existing Buildings)

Name of the property	Certification type	Valid	Result
Bartók Ház	O+M: Existing Buildings v3 2009	The rating has no expiration date.	GOLD
Canada Square	O+M: Existing Buildings v3 2009	The rating has no expiration date.	GOLD
Capital Square	O+M: Existing Buildings v3 2009	The rating has no expiration date.	GOLD
Center Point	O+M: Existing Buildings v3 2009	The rating has no expiration date.	GOLD
City Gate	O+M: Existing Buildings v3 2009	The rating has no expiration date.	GOLD
Ericsson House	O+M: Existing Buildings v4 - LEED v4	The rating has no expiration date.	GOLD
Infopark A	O+M: Existing Buildings v3 2009	The rating has no expiration date.	GOLD
Infopark Building D	O+M: Existing Buildings v4 - LEED v4	The rating has no expiration date.	SILVER
IP West	O+M: Existing Buildings v3 2009	The rating has no expiration date.	GOLD
Office Garden II	O+M: Existing Buildings v3 2009	The rating has no expiration date.	GOLD
R70	O+M: Existing Buildings v3 2009	The rating has no expiration date.	GOLD
Váci 33	O+M: Existing Buildings v3 2009	The rating has no expiration date.	SILVER
Vizivaros Office Center	O+M: Existing Buildings v3 2009	The rating has no expiration date.	GOLD

LEED Accredited Professionals in Hungary[13]

Full Name	Job Title	Organization	LEED Credentials
Norbert Szircsak			LEED AP ID+C
Borbala Cross-Boda	Senior Consultant	Denkstatt Hungary Kft.	LEED AP
Krisztina Sárosdi-Mádi	Head Architect, managing director	MadiLancos Studio	LEED Green Associate
Andras Schmidt	Sustainability Manager		LEED AP
Petra Holy	Asset Manager	Bluehouse Capital	LEED Green Associate
Andras Bujk	HVAC engineer	KESZ Epito Zrt.	LEED AP BD+C
Mate Orosz	Architectural and structural designer		LEED AP BD+C
Melinda Orova	Consultant	ABUD Mernokiroda Kft.	LEED AP BD+C
Tamas NICZKI	Visiting Senior Architect	Perkins and Will	LEED AP BD+C
Norbert Harmathy	PhD architect-engineer , sustainability consultant, energy simulation engineer	Aspectus Architect Ltd.	LEED AP BD+C
Boglarka Balint	Assistant Project Manager	Obuda-Ujlak Zrt.	LEED AP BD+C
Veronika Tari-Szkiba	Project Manager	CEH Planning, Developing and Consulting Inc.	LEED AP BD+C
Barbara Fekete	Transaction Manager / Deutsche Bank Account		
Eszter Borbely	M.Sc. Achitect, Discipline engineer	Viadoratrium Ltd.	LEED AP O+M
Krisztian VEROK	Project Manager, LEED AP, Technical Supervisor	CÃ‰H Inc, COMITOR Ltd.	LEED AP BD+C
Katalin Csaplar	Sustainability consultant	Sentient Kft	LEED AP BD+C
Marta Zsoter	Green coordinator	Skanska Construction Hungary Ltd.	LEED Green Associate
Monika Vertesy	Green Building Consultant, LEED AP BD+C, WELL AP	TSPC	LEED AP BD+C
Adrienn Gelesz		ABUD Ltd	LEED AP BD+C
Tibor Jano	project director	AURORA E.I.M. Ltd.	LEED Green Associate
Miklos Szebenyi			
Norbert Szircsak			
Monika Egyed	Head of sustainability	Obuda-Ujlak Zrt.	LEED Green Associate

[13] Source: https://www.usgbc.org/people?Country=%5B%22Hungary%22%5D

Timea Szabo	Project Architect	Arrowstreet	LEED AP BD+C
Katalin Jozsa	Project Manager	Realiscon	LEED Green Associate
Zsuzsanna Gidro	Sustainability Consultant	DVM Design	LEED Green Associate
Diana Apro	Consultant	DVM Group	LEED AP ID+C
Marton Varga	architect // interior designer	ML2s Sustainable Solutions Ltd.	LEED Green Associate
Pal Andras Rutkai	Senior Architect, Founder	Healing Spaces - Healthcare Design Consultancy	LEED Green Associate
Miklos Peszlen	Project manager	Skanska Construction Hungary Ltd.	
Minnan Wang	Student	Central European University	
Veronika Takacs	Project Manager	Millenia Zrt.	
Ida Kiss	architect		
Lan Li	Student	CEU	
Shusheng Li	engineer	CEEC	
Laszlo Madas	Construction Supervisor	Takenaka Europe GmbH Hungary Branch	
Balint Poth	CEO	Via Energia Kft.	
Peter Koczkas	Architect	MadiLancos Studio	
Layth Al-Rukaibawi	PhD Researcher	Budapest University of Technology and Ec	
Edina Hornok	Head of sustainability consultancy		
Gabor Pados	Project Manager	WING Ltd.	
Monika Farkas-Herbel	site manager	KESZ Epito Zrt.	
Szilvia Hinkel	Researcher	Colliers International	
Adam BEKES	MD, Architect Msc	Value 4 Real Ltd.	
Sandra Stojanovic	Research fellow	Bay Zoltan Nonprofit Ltd.	
Balazs Jelinek	Project Manager	VÃ¡rosliget Zrt.	
Robert Kis	Mechanical Engineer	Mylan Hungary Kft	
Regina Kurucz	WELL AP, WELL Faculty	Freelancer	
Eszter Konrad			
Zsolt Gyongyosi	Head of environmental consultancy		
Zsolt Kovacs	engineer	Henkel Magyarorszag Kft.	
Robert Varga	Consultant	Eston International Property Advisors	
Demeter Sztanko	Senior Project Manager	CÃ‰H Planning, Developing and Consulting Inc.	
Balazs Janos Molnar	Architect	KESZ Epito Zrt.	

Tibor Mucsanyi	mechanical engineer	MSTT Bt	
Stephen Saracco	Lead Project Manager	Bratton Realty Services Kft	
Istvan Varadi	facility management	Henkel Magyarorszag Kft.	
Goldmann David	Businessman, Investor, farmer		
Akos Javorcsik			
Alexander Sarkozi	Intern Architect	12 Raszter Kft.	
Anna Hernadi			

3.5.5. Description of the rated buildings

Area development

The Freeport of Budapest Logistics Ltd. started a significant logistics development in the northern part of Csepel. During the development, we consider environmental awareness to be important in all our new, modern buildings; a separate team is working on the sustainable design of our buildings during the design, construction phase already, and these aspects will be prioritized in future operations as well. This is demonstrated by the certificates we've obtained regarding our buildings as well:

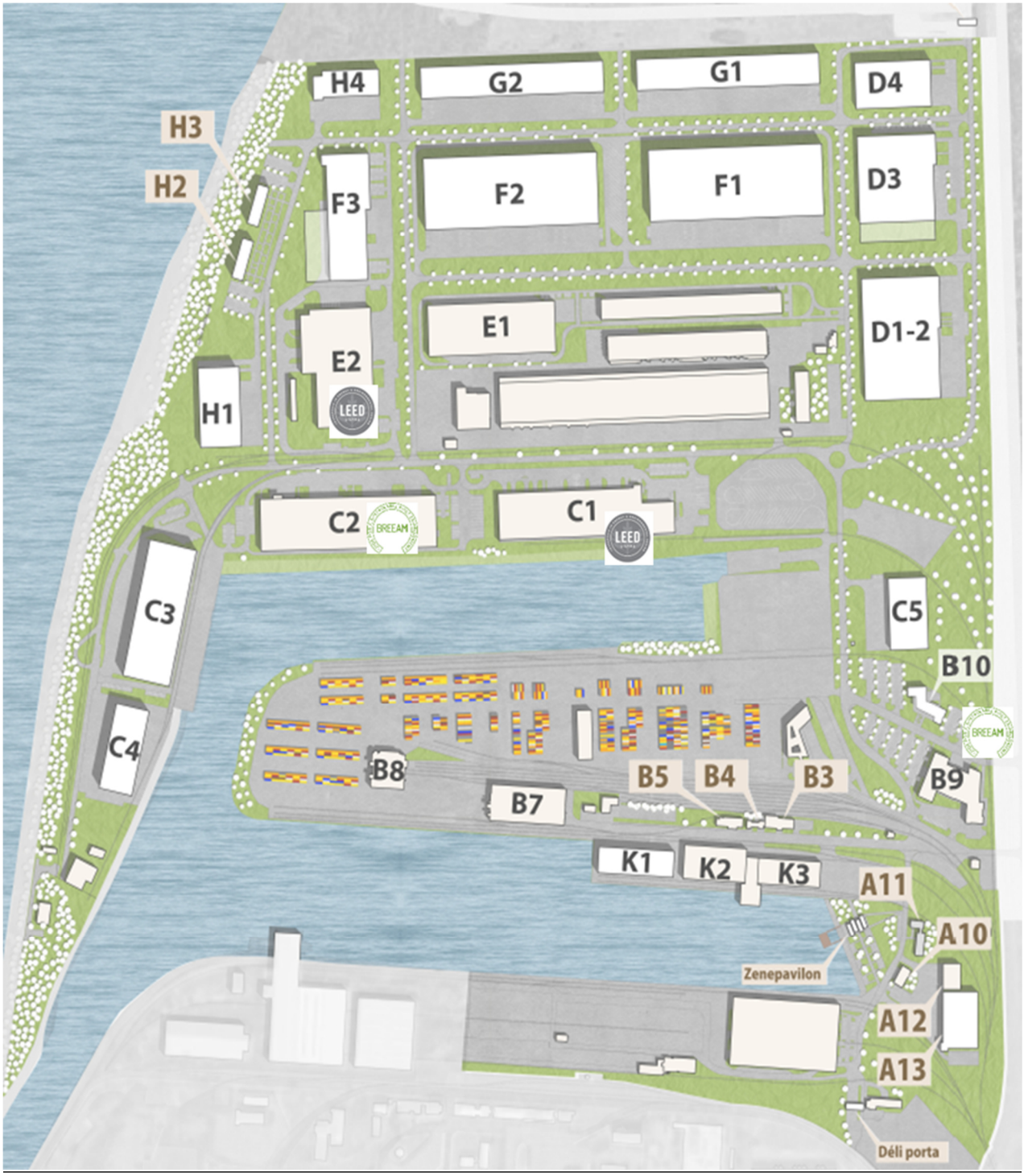
- BSZL C2 – BREEAM Good,
- BSZL C1 – LEED Silver,
- BSZL E2 – LEED Silver and
- BSZL B9 – BREEAM Good.

During the certifications, Óbuda-Újlak Zrt., one of the market leaders in Hungary has provided consultancy and assessor services, including the provision of a BREEAM Accredited Professional, a BREEAM International Assessor, as well as a LEED Accredited Professional. In addition, they have supplemented the technical standard of BSZL so that in case of all new developments, the most important sustainability aspects form part of the design briefs as well.

The area of the Freeport of Budapest is 153 hectares, which is located 5 km from the center of Budapest and is the largest area that can be used for logistics purposes within the M0 ring road.

The northern area of the Port provides an opportunity for development and improvement. In addition to the developments implemented and still in progress since 2014, approximately 120,000 m^2 of warehouse / factory / service facility can be built in this area.

Regarding the site coverage, the installation concept has been prepared by BSZL Ltd, which is operating the Port:



There is a constant interest in the services of the Port, which is not limited to only the classic port activities (properties marked A and B), but we are also negotiating, at different stages, rental and / or development functions with companies newly located in the Port.

According to the valid contracts and regulatory plans, at least 75% of the Port areas must be used for Logistics activities.

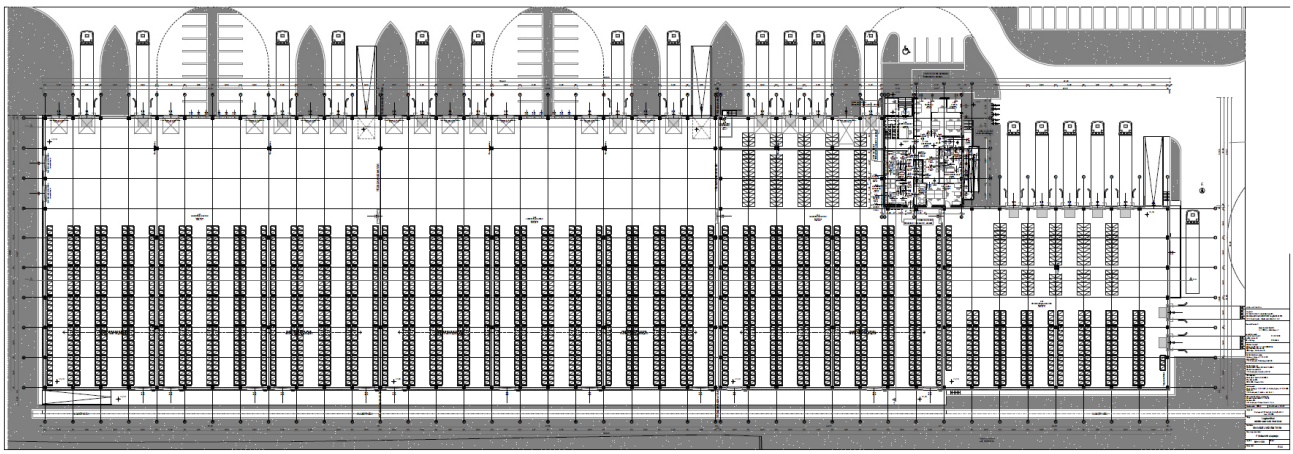
As a result, the following buildings have been built in the Development area in the recent period:

C1 warehouse:

- year of construction: 2014 (Phase 1), 2016 (Phase 2),
- 12,000 m^2 warehouse + 1,000 m^2 multi-storey office,
- Crossdock and classic warehouse,
- 11 m useful ceiling height and
- LEED Silver certification.

A few technical details about the building:

Load bearing structure: The building is a prefabricated reinforced concrete frame structure. Prefabricated reinforced concrete panel slabs are made on multi-storey office parts. Roof structure: The roof structure is orthotropic trapezoidal sheet. Outer shell: A sandwich panel with rock wool seal and metal covering. Warehause floor: Steel fiber reinforced industrial floor.



LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN
LEED
SILVER

BSZL C1
LOGISTICS WAREHOUSE AND OFFICE

Budapest, Hungary

HAS FULFILLED THE REQUIREMENTS OF THE LEED GREEN BUILDING RATING SYSTEM CERTIFICATION ESTABLISHED BY THE U.S. GREEN BUILDING COUNCIL AND VERIFIED BY GREEN BUSINESS CERTIFICATION INC.

LEED 2009
NEW CONSTRUCTION AND MAJOR RENOVATIONS

SILVER

April 2018

Mahesh Ramanujam

MAHESH RAMANUJAM, PRESIDENT & CEO, U.S. GREEN BUILDING COUNCIL,
PRESIDENT & CEO, GREEN BUSINESS CERTIFICATION INC.

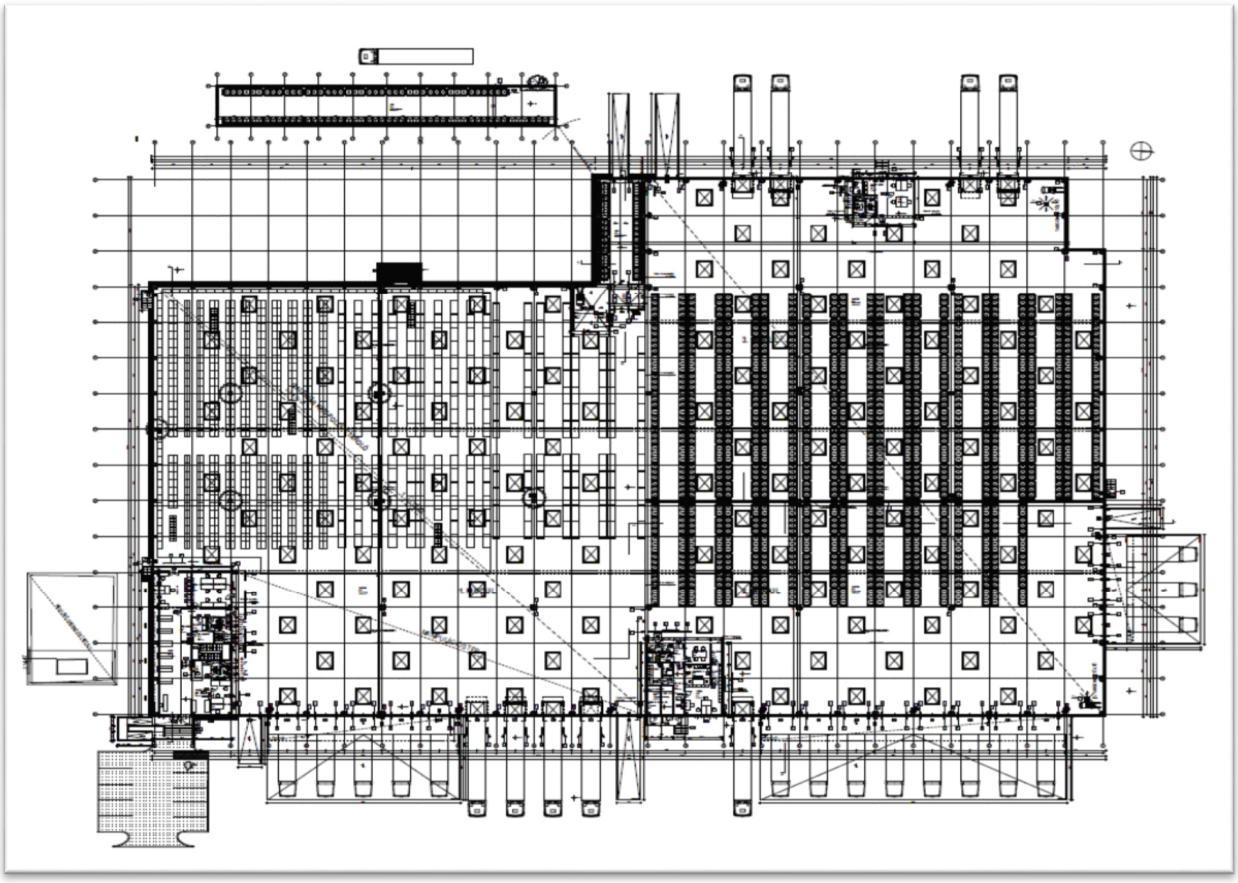
E2 warehouse:

- year of construction: 2016-2017,
- 12,000 m^2 warehouse + 600 m^2 office,
- Crossdock and classic warehouse + ADR storage,
- 10 m useful ceiling height and
- LEED Silver certification.

A few technical details about the building:

Load bearing structure: The building is a prefabricated reinforced concrete frame structure. Prefabricated reinforced concrete panel slabs are made on multi-storey office parts. Roof structure: The roof structure is orthotropic trapezoidal sheet. Outer shell: A sandwich panel with rock wool seal and metal covering. Warehause floor: Steel fiber reinforced industrial floor.

There is a storage facility for hazardous materials in the north-west corner of the building and an outdoor, open-covered ADR warehouse.




E2
DOCK
E2
DOCK

C2 warehouse:

- year of construction: 2017-2018,
- 10,000 m^2 warehouse + 900 m^2 multi-storey office,
- Crossdock and classic warehouse,
- 12 m useful ceiling height and
- BREEAM Good certification.

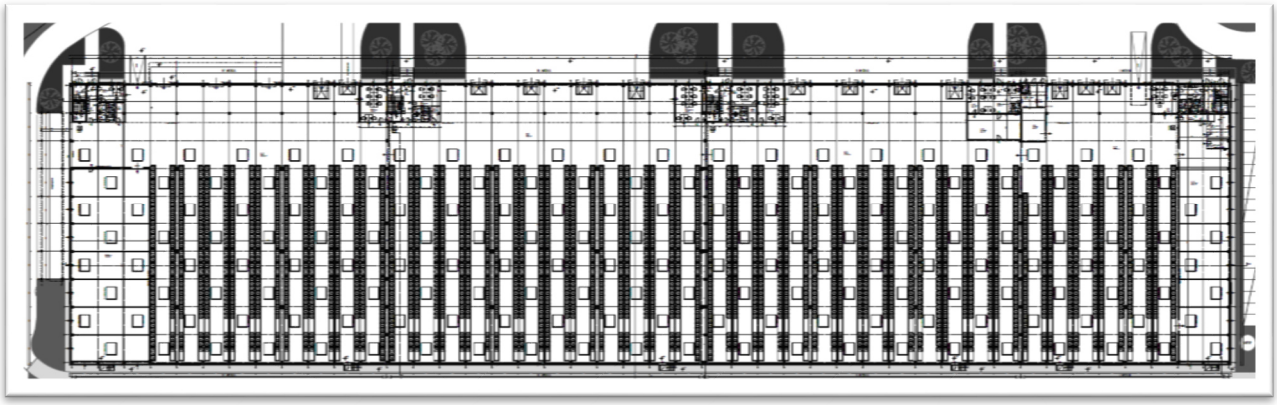
A few technical details about the building:

Load bearing structure: The building is a prefabricated reinforced concrete frame structure. Prefabricated reinforced concrete panel slabs are made on multi-storey office parts. Roof structure: The roof structure is orthotropic trapezoidal sheet. Outer shell: A sandwich panel with rock wool seal and metal covering. Warehause floor: Steel fiber reinforced industrial floor (with a 70 kN/m2 load bearing capacity).

The net floor area of hall C2 is 17,151 m2 of which warehouse: 15,486 m2, other: 1,665 m2.


E2
C2


céglogó
céglogó
C2




C2

BREEAM®

Code for a Sustainable Built Environment
www.breeam.com

Final Certificate

The assessment of:

BSZL C2 csarnok
Weiss Manfred ut 5-7.
Budapest
1211
Hungary

CODE FOR A SUSTAINABLE BUILT ENVIRONMENT
BREEAM INTERNATIONAL

has been carried out according to Technical Manual:
BREEAM International New Construction 2016
Industrial
Fully Fitted
and based on the Assessment Report produced by:
Obuda Ujlak ZRT
has achieved a score of **48.1%**
Good

Certificate Number: **BREEAM-0067-4473** Issue: **01**

BRE Global Limited is accredited by UKAS. The assessment process is certified by BRE Global Limited in accordance with the requirements of Scheme Document SD123

05 July 2019	Budapesti Szabadkikoto Logisztikai Zrt.
	Nandor Kovacs
TH-Studio Epitesz Iroda Kft.	NK12
Budapesti Szabadkikoto Logisztikai Zrt.	Weinberg '93 Epito Kft.

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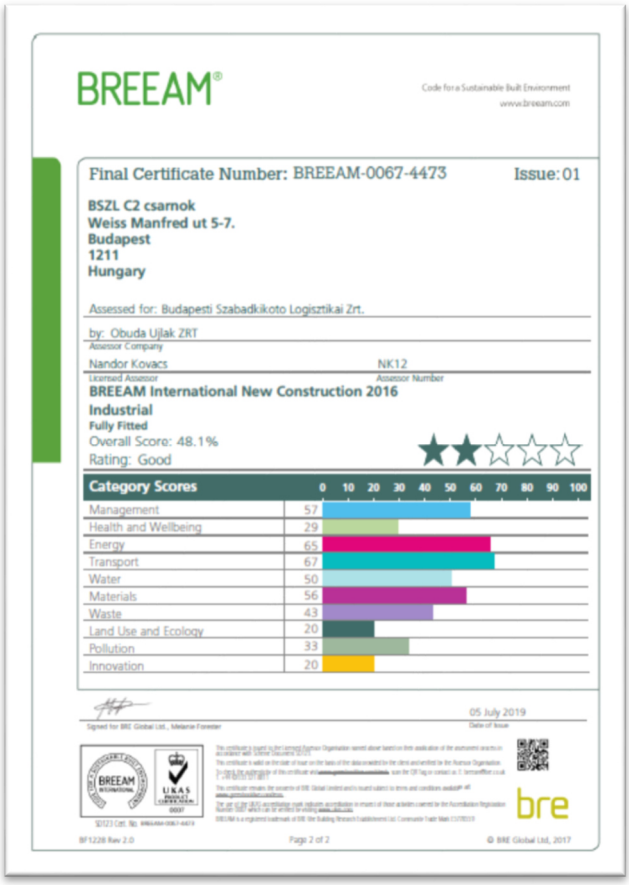

BREEAM®

Code for a Sustainable Built Environment
www.breeam.com

Final Certificate Number: BREEAM-0067-4473 Issue: 01

BSZL C2 csarnok
Weiss Manfred ut 5-7.
Budapest
1211
Hungary

Assessed for: Budapesti Szabadkikoto Logisztikai Zrt.

by: Obuda Ujlak ZRT
Assessor Company

Nandor Kovacs — NK12
Licensed Assessor — Assessor Number

BREEAM International New Construction 2016
Industrial
Fully Fitted
Overall Score: 48.1%
Rating: Good

Category Scores	0 10 20 30 40 50 60 70 80 90 100
Management	57
Health and Wellbeing	29
Energy	65
Transport	67
Water	50
Materials	56
Waste	43
Land Use and Ecology	20
Pollution	33
Innovation	20

05 July 2019
Date of Issue

Signed for BRE Global Ltd., Melanie Forester

BREEAM INTERNATIONAL — UKAS MANAGEMENT SYSTEMS 0037

bre

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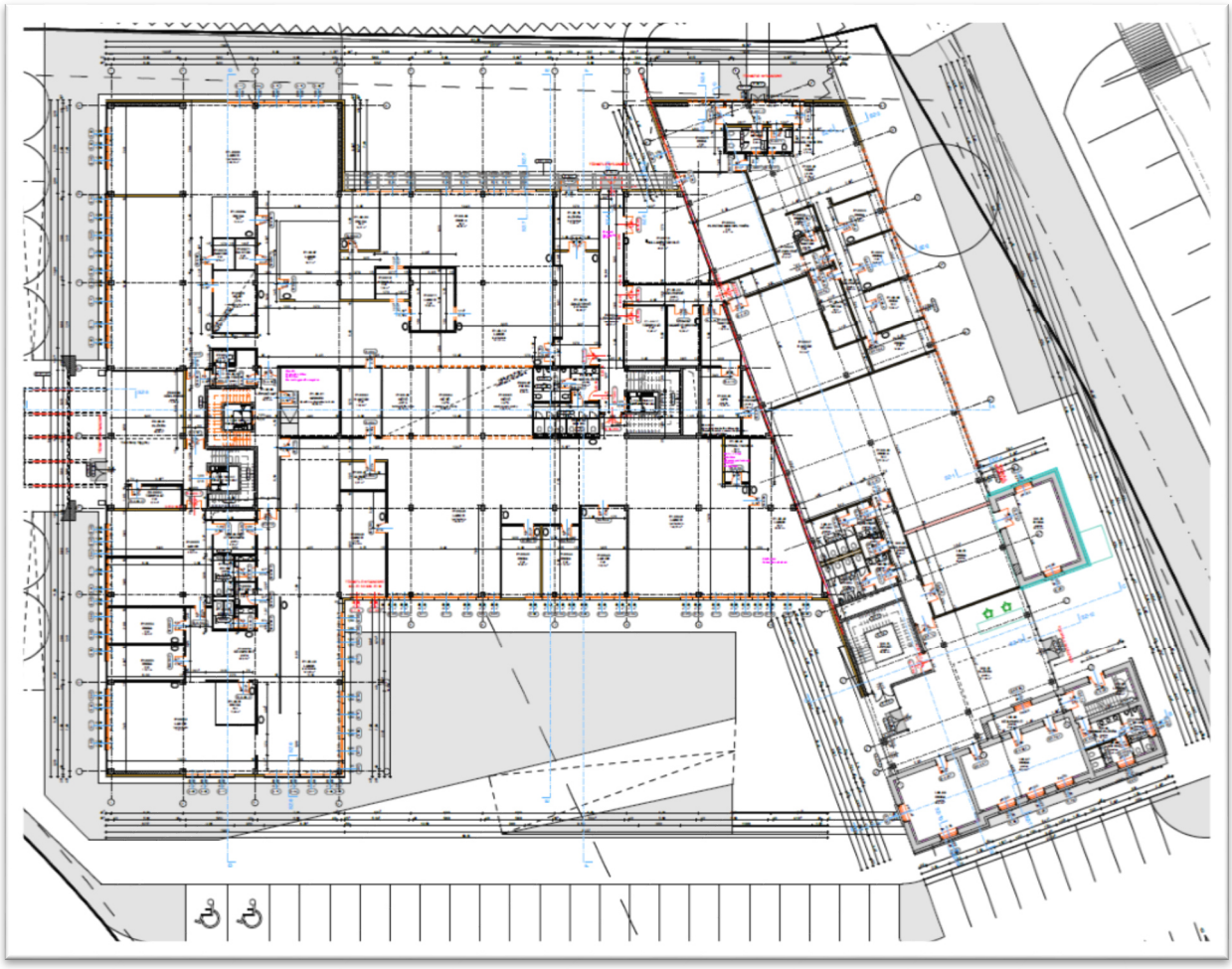
B9 office (and medical laboratory):

- year of construction: 2017-2019,
- 3x2,600 m^2 multi-storey office,
- office with a 3,6 m ceiling height and medical laboratory and
- BREEAM Good certification.

A few technical details about the building:

A complex of rental offices and laboratories with a built-up floor area of approximately 3,400 m2 and a gross floor area of approximately 9,500 m2, with no basement, two- and three-storey parts, has been established. Load bearing structure: The building is a prefabricated reinforced concrete frame structure. Prefabricated reinforced concrete panel slabs are made on multi-storey office parts. Outer shell: A sandwich panel with rock wool seal and metal covering.



BREEAM®

Code for a Sustainable Built Environment
www.breeam.com

Final Certificate

The assessment of:

BSZL B9 Irodaház
Weiss Manfréd út 5-7.
Budapest
1211
Hungary

CODE FOR A SUSTAINABLE BUILT ENVIRONMENT
BREEAM INTERNATIONAL

has been carried out according to Technical Manual:
BREEAM International New Construction 2016
Bespoke
Fully Fitted
and based on the Assessment Report produced by:
Obuda Ujlak ZRT
has achieved a score of **45.9%**
Good

Certificate Number: **BREEAM-0069-2053** Issue: **01**

BRE Global Limited is accredited by UKAS. The assessment process is certified by BRE Global Limited in accordance with the requirements of Scheme Document SD123

07 July 2020 Date of Issue	Budapesti Szabadkikoto Logisztikai Zrt. Client for the Assessment
Catherine Butcher Signed for BRE Global Ltd., Catherine Butcher	Nandor Kovacs Licensed Assessor
N-GON Studio Kft. Architect	NK12 Assessor Number
Budapesti Szabadkikoto Logisztikai Zrt. Developer	AKTUAL BAU Epitoipari és Kereskedelmi K! Principal Contractor
Gepesz Central Kft. Mechanical Contractor	Elektro Profi Vallalkozasi Kft. Electrical Contractor

BREEAM INTERNATIONAL UKAS PRODUCT CERTIFICATION 0007

SD123 Cert. No. BREEAM-0069-2053

This certificate is issued to the Licensed Assessor Organisation named above based on their application of the assessment process in accordance with Scheme Document SD123.
This certificate is valid on the date of issue on the basis of the data provided by the client and verified by the Assessor Organisation.
To check the authenticity of this certificate visit www.greenbooklive.com/check, scan the QR Tag or contact us: t: breeam@bre.co.uk
T: +44 (0)333 321 8811

This certificate remains the property of BRE Global Limited and is issued subject to terms and conditions available at: www.greenbooklive.com/terms
The use of the UKAS accreditation mark indicates accreditation in respect of those activities covered by the Accreditation Registration Number 0007 which can be verified by visiting www.ukas.com
BREEAM is a registered trademark of BRE The Building Research Establishment Ltd. Community Trade Mark 017780511

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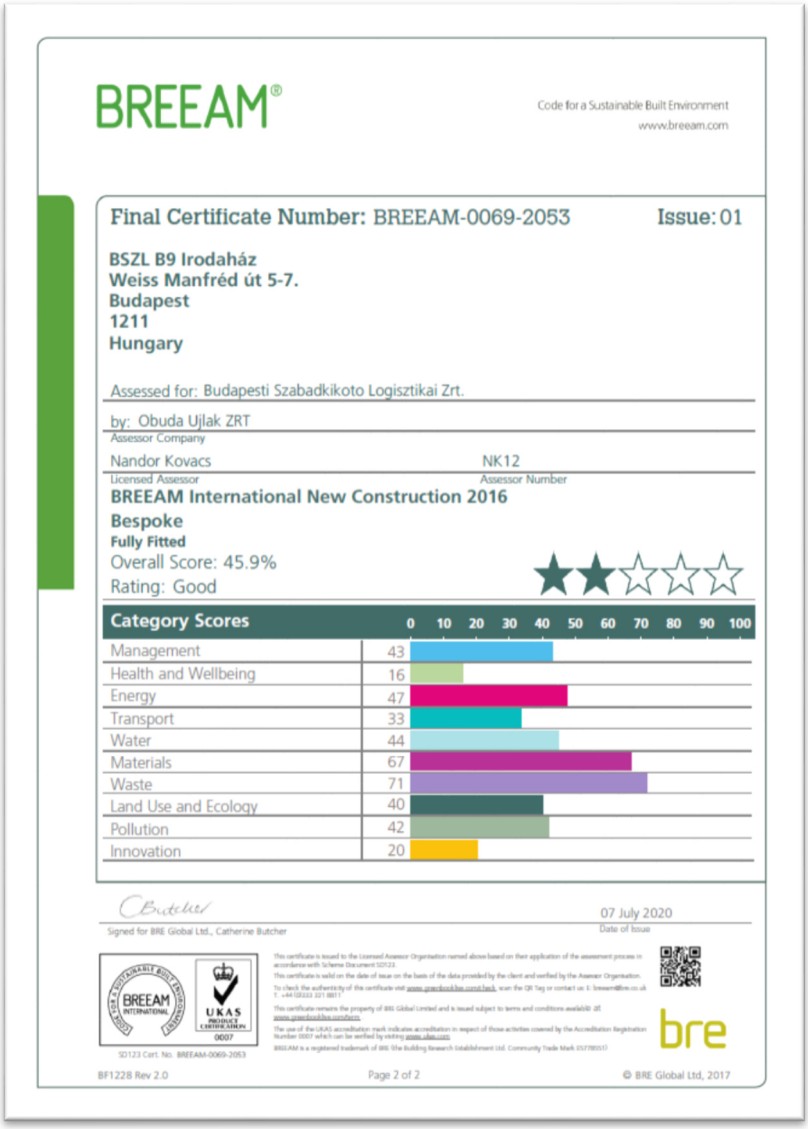

BREEAM®

Code for a Sustainable Built Environment
www.breeam.com

Final Certificate Number: BREEAM-0069-2053 **Issue:** 01

BSZL B9 Irodaház
Weiss Manfréd út 5-7.
Budapest
1211
Hungary

Assessed for: Budapesti Szabadkikoto Logisztikai Zrt.

by: Obuda Ujlak ZRT
Assessor Company

Nandor Kovacs — NK12
Licensed Assessor — Assessor Number

BREEAM International New Construction 2016
Bespoke
Fully Fitted
Overall Score: 45.9%
Rating: Good

Category Scores	0 10 20 30 40 50 60 70 80 90 100
Management	43
Health and Wellbeing	16
Energy	47
Transport	33
Water	44
Materials	67
Waste	71
Land Use and Ecology	40
Pollution	42
Innovation	20

Signed for BRE Global Ltd., Catherine Butcher
07 July 2020
Date of Issue

SD123 Cert. No. BREEAM-0069-2053

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3.5.6. Used technologies to achieve certification

In this chapter we show what steps the FBL has taken to meet the requirements found in the chapter describing the LEED and BREEAM certifications. When rating each hall, the way in which each criterion is met may be different, but in general, the steps presented here are recommended for consideration for all industrial properties wishing to obtain a certification. As can be seen from the certifications obtained, the steps listed here are sufficient to meet the entry level; additional criteria are required to meet a higher level, however, the FBL has not yet gained experience in this.

You can find the used tables for the whole BREEAM certification process in attachment (Annex 2). If you can go throught the tables, you can see line by line the BREEAM requirements and the proposals/comments from the Qualifier (Óbuda-Újlak Zrt.). In the proposals you can see if these credits can be reached and how.

The following proposals are a short “lessons learnt” section after four (2 LEED and 2 BREEAM) delivered qualification process.

Rehabilitation of brownfield sites

We have assigned a brownfield area with significant logistical potentials for our developments. This investment – implemented in a former factory area which is no longer in operation – fits well with the development objectives of the capital's Széchenyi Plan and it also exploits the internal reserves of Budapest. For example, a concrete site used to be operating in the construction area of the E2 logistics hall.

Development of public transport

We consciously pay attention that we do not exceed the minimum number of parking spaces provided for by the local regulations, in order to facilitate the use of public transport. The parking spaces of the halls have been established in accordance with this as well. The public transport possibilities of the area are good, with easy access to the track-based transport means (H7 HÉV). A separate bus line has been introduced in the first half of 2020 for supplying the internal parts of the area, which has been adjusted to the different shifts.

Supporting alternative forms of transport

At the entrance of the buildings, we have created a bicycle racks adjusted to the number of the workers. The changing rooms and showers in the buildings provide the conditions necessary for daily bicycle usage. There are dedicated electric car and carpool parking places next to halls.

Sustainable construction practices

During the construction, we put a lot of emphasis on protecting the environment and on the health protection of the workers. During the construction of the buildings, we paid special attention to minimizing the damage to the flora caused by the works. Furthermore, the resulting construction waste is collected completely and selectively.

Ecological garden design

When designing the gardens around the buildings, we have considered different ecological aspects, for example, we've planted plants that are "indigenous" in Hungary and do not require watering.

Water saving measures

In order to reduce water consumption, we have installed water-saving fittings in the buildings.

Energy-conscious selection of materials

At hall E2, the roofs have been established with high solar reflectance index (SRI) in order to reduce the development of the so-called heat islands, and paving with grey tiles have been constructed near the halls.

Environmentally friendly use of materials

When choosing the materials, the pavings and the furniture of our buildings, we have paid special attention to use environmentally friendly and health-friendly products, which have low Volatile Organic Compound (VOC) emission and have a valid EPD (Environmental Product Declarations) certification.

Selective waste collection

In the area, we have created opportunity for selective waste collection both inside and outside of the buildings. All certified halls collect waste selectively, in 5 different groups: paper, cardboard, plastic, metal and glass.

Energy metering

Energy metering equipment is provided in the building which is capable of sub-meter tenanted areas, different functional areas and major energy-consuming systems (gas, electricity, water and heat). The installation of the sub-meters enables future connection to an energy monitoring and management system.

Designing for durability and resilience

Suitable durability and protection measures and design features have been implemented to avoid material degradation due to environmental factors and building use.

Environmentally friendly heating and cooling

All chillers applied on the project contain refrigerant with low GWP (Gloal Warming Potentioal) value and all combustion equipment applied on the project have now NOx emission to minimise air pollution.

Renewable energy

Solar collectors are placed on the roofs to help serving the buildings' domestic hot water needs.

Healthy work environment

Combined with the above, we provide a user-friendly and environmentally friendly work environment for our colleagues who use the buildings.

Smoking policy

Smoking is possible only outdoors, in a covered area next to each building, at designated locations.

Daylighting and view out

Relevant areas of the building are provided with appropriate levels of daylighting, and good view out features, thanks to the design solutions.

Lighting

LED lighting fixtures and fluorescent lamps with high frequency ballasts are provided both in the warehouse and the office areas.

The internal ventilation of the buildings

The ventilation of the buildings is mostly done by natural means; the windows can be opened in halls C1 and E2.

3.6. Step by Step description of the implementation for a BREEAM rating

Presentation of the BREEAM certification

The BREEAM (Building Research Establishment Environmental Assessment Method) is an internationally recognized UK rating system that examines and certifies the sustainability of buildings. Its criteria include the following topics related to buildings: management and project preparation, health and well-being, energy, transport, water use, material use, waste management, land use and ecology, pollution prevention.

In the BREEAM system, the building to be rated can be certified in one or two steps.

The so-called Design Stage certification - which results in a temporary BREEAM rating - determines the sustainability performance of the building based on the existing facilities (eg location of the investment, public transport), documents provided by the investor, architectural and professional plans, specifications and the investor's commitments. The BREEAM rating is marked "temporary" at this stage, as the Design Stage rating does not guarantee the BREEAM performance of the completed building. Design Stage certification is not a prerequisite for obtaining a final BREEAM certification.

The final, so-called Post-Construction Stage certification examines and evaluates the completed condition of the building and the entire process of development after the completion of the construction work. In addition to the development plans, this certification procedure also takes into account the fulfillment of a number of other requirements, including those related to construction.

During the BREEAM certification process, the investment must meet the requirements set for the main topics listed above. The exact requirements are contained in so-called credits.

Credits include prerequisites that must be met in order for a building to qualify for certification.

There are other credits that must be completed, which are the minimum required to reach the different certification levels; as the certification levels grow higher, they have more and more mandatory requirements. The project also receives points for mandatory credits.

Finally, there are optional credits by which the project earns additional points.

The level of certification achieved depends on the mandatory requirements met and the overall score obtained. The overall score is weighted for each credit (weighting varies by region based on the weightings provided by the certification agency (BRE).

Depending on the score achieved, the following certification levels are available:

- Pass 30%
- Good 45%
- Very Good 55%
- Excellent 70%
- Outstanding 85%

Most of the targeted credits can be met with appropriate architectural and professional planning, but there are some, whose certification is the responsibility of the investor and there are many that are related to construction or operation.

BREEAM relies primarily on European standards, so many requirements are not a particular challenge for designers.

Maintaining the BREEAM certification

BREEAM only reviews the sustainability performance of a building once after it has been completed. If the building obtains the certification, this applies to the entire lifespan of the building, no further audits are required to "maintain" the certification.

During the certification, depending on the credit strategy, the investor can also undertake to meet certain requirements in the future (eg monitoring the energy and water consumption data of the building and sending the data to the rating organization). These credits can be obtained by the

investment on the basis of an appropriate investor declaration. The obligation usually lasts for a maximum of 3 years from the date of completion.

Nonetheless, BREEAM also offers the option of the in-use certification of the building, in the form of the so-called BREEAM In-Use rating system.

Partners involved

BREEAM certification generally requires the cooperation of the following partners:

- Investor,
- Architects and professional designers (mainly building engineering, electricity, BMS, landscaping, utilities, transport),
- Contractor(s),
- Operator,
- BREEAM consultant and assessor and
- Additional specialists, depending on the developed credit strategy (eg elevator designer, acoustic specialist, ecologist, accessibility specialist, thermography specialist, adjustment specialist).

Chronological description of the rating, time-critical elements

The BREEAM consultant should be involved in the project already in the project preparation phase. The primary reason for this is that there are time-critical credits that can only be obtained in the initial phase of the project (eg stakeholder consultations, properly trained acoustic involvement, etc). In addition, it is advantageous from the point of view of certification because the earlier the credit strategy is completed (ie how the building will be able to achieve the set rating level), the more economically it is possible to go through with the certification.

Key milestones of the certification:

- Pre-assessment, compilation of credit strategy
  - defining the target certification level and the necessary credit strategy in cooperation with the investor
  - as soon as possible, optimally already in the project preparation phase
- Design in accordance with targeted BREEAM requirements
  - from concept design to construction plans
- Optional step during the design phase: BREEAM Design Stage certification
  - based on current plans and investor commitments
  - the lead time is approx. 3-6 months, the end result is an intermediate BREEAM certification
- Construction in accordance with targeted BREEAM requirements
  - with particular regard to waste management, the use of materials from responsible sources, appropriate pollution control measures during construction, monitoring of energy and water consumption and deliveries

- Finishing work and handing over of buildings in accordance with targeted BREEAM requirements
  - with particular regard to the adjustment of mechanical and electric systems, the preparation of an appropriate building user manual, the training of building operation and the use of the systems in the building
- BREEAM Post-Construction certification
  - based on the realized status
  - the lead time is approx. 3-6 months, the end result is a final BREEAM certification
- After obtaining the certification, depending on the credit strategy: fulfillment of investor/operator commitments
  - E.g. monitoring and reporting of energy and water consumption to the certification body, user satisfaction assessment, subsequent fine-tuning of the building's mechanical systems

Extract from the BREEAM certification scoreboard, you can find the used tables for the certification process in attachment (Annex 2).

		Title	Requirements
Man	**01**	**Project brief and design**	
		Stakeholder consultation (project delivery)	Sustainability principles are established before the concept design phase; stakeholders meet and their roles and responsibilities are defined for each project phase.
		One credit - Stakeholder consultation (third party)	Identification of all stakeholders involved in the project, contact and consultation before making important planning decisions, a timetable for the consultations is prepared, response to all suggestions.
		One credit - Sustainability champion (design)	Defining BREEAM targets set by a BREEAM expert at the latest at the beginning of concept design. In the feasibility phase, the BREEAM expert monitors the performance of the project in terms of the set targets.
		One credit - Sustainability champion (monitoring progress)	In the planning phases, the BREEAM expert monitors the performance of the project in terms of the set targets.
Man	**02**	**Life cycle cost and service life planning**	
		Elemental life cycle cost (LCC)	Preparation of a life cycle cost analysis (LCC) in the feasibility phase.
		Component level LCC options appraisal	The life cycle cost analysis has been completed for at least 2 structural system elements (strategic and system level).
		Capital cost reporting	Report the cost of capital of the project.
Man	**03**	**Responsible construction practices**	All timber used in the construction comes from a legal source (by BREEAM definition). Observance of Hungarian health and safety regulations and standards during planning and construction.
		Environmental management	The contractor operates an EMS system and environmental measures are taken during construction.
		Sustainability champion (construction)	During the implementation phase, the BREEAM expert monitors the fulfillment of the set BREEAM target values.

		Considerate construction	Measuring the environmental and social awareness of the construction according to the points in Checklist A1.
		Monitoring of site impacts - Utility consumption	Measurement and monitoring of energy consumption (total kWh, kWh / project value 10%), CO2 emissions (total kgCo2, kgCo2 / 10% project value) during construction. Measurement and monitoring of piped water consumption (net total m3, m3 / project value 10%) during construction.
		Monitoring of site impacts - Transport	Measurement and monitoring of construction materials (structural elements, insulation, foundations, landscaping materials) transported to site and waste removal from the site during construction, total fuel consumption of transport (material and waste separately) (l), CO2 emissions (kq CO2 eq), all km covered.
Man	**04**	**Commissioning and handover**	
		Commissioning and testing schedule and responsibilities	Supervision of the adjustment of the mechanical and electronic systems of the building (compliance with local standards) by (a) designated person(s).
		Commissioning building services	The commissioning of the complex systems of the building is carried out by a designated suitably qualified person in charge, while the implementation of the simpler systems is the responsibility of the member of the construction team.
		Handover	A building user guideline (BUG) and training schedule is prepared.
Man	**05**	**Aftercare**	
		Aftercare support	After the commissioning of the building monitoring of energy and water consumption for a minimum of 12 months, comparison with target values, informing building users, measuring satisfaction in the period after handover.
		Seasonal commissioning	During the first 12 months after the commissioning of the building, the systems listed above are also re-regulated on a seasonal basis under the guidance of designated professionals, taking into account building user satisfaction surveys and operational tests.
		Post-occupancy evaluation (POE)	1 year after the commissioning of the building, the owner has a third party prepare an assessment on the design and construction process, the opinion of the building users (including FM), and the design and environmental aspects of the building.
		Exemplary performance requirements	In the first three years after the handing over of the building, measuring user satisfaction and collecting consumption data, preparing quarterly reports, providing feedback to designers, sending data to BRE.
Hea	**01**	**Visual comfort**	All fluorescent and compact fluorescent luminaires are equipped with electrical ballast or only LED lighting is used in the building.
		Glare control	Adjustability / controllability of anti-glare shielding systems in relevant rooms.
		Daylighting	Adequacy of natural sun and illumination values in the affected areas of the buildings (all areas used for more than 30 minutes).
		View out	Ensuring a proper view for workstations taking into account the maximum distance from windows.
		Internal and external lighting, zoning and occupant control	The external and internal lighting values, evenness and glare-free, comply with the requirements of the MSZ EN 12464 standard. The lighting can be controlled in every zone.
Hea	**02**	**Indoor air quality**	Products containing asbestos must not be used.

		Indoor air quality (IAQ) plan	An IAQ plan is prepared to ensure adequate indoor air quality. A flush out is performed before use.
		Ventilation	The air intakes are located at a suitable distance from various sources of contamination (including the exhaust vents). Provision of fresh air volumes according to EN 13779 Table A.11.
		Emissions from building products	Emissions of volatile organic compounds (paints, adhesives, coatings) comply with the emission limits and can be verified by measurement / certification by the manufacturer.
		Post-construction indoor air quality measurement	The post-construction volatile organic compound emission concentration and the formaldehyde concentration comply with the limit values, and the contractor can prove this by measurement.
		Potential for natural ventilation	Provide the possibility of natural ventilation with windows that can be opened or otherwise, easy for users to operate in at least two stages.
		Exemplary performance requirements	Standard VOC levels measured in the constructed building remain below 0.01 mg / m^3.
Hea	**04**	**Thermal comfort**	
		Thermal modeling	Perform thermal comfort modeling or analytical assessment of the building, the comfort parameters shall comply with Annex A of ISO standard 7730 and other specifications.
		Adaptability - for a projected climate change scenario	Perform thermal comfort modeling on the building, the comfort parameters shall comply with Annex A of ISO standard 7730 in case of climate change.
		Thermal zoning and controls	Performing dynamic thermal comfort modeling, zoning heating / cooling control.
Hea	**05**	**Acoustic performance**	Commissioning an appropriately qualified acoustic expert, design consulting.
		Indoor ambient noise and sound insulation	Indoor noise levels as well as the degree of sound insulation of acoustically sensitive rooms and other areas comply with BREEAM regulations.
		Reverberation times	In rooms dedicated to speaking (meeting room, lecture hall), the reverberation time values comply with the requirements of BREEAM.
Hea	**06**	**Accessibility**	
		Safe access	Ensuring safe transport conditions for pedestrians and cyclists
		Inclusive and accessible design	An accessibility strategy is developed. Shared spaces are created.
Hea	**09**	**Water quality**	The risk of developing legionella in wet mechanical systems (buildings, outdoor water features) is minimal by meeting the following requirements: - The design, installation and operation of hot and cold water and cooling systems comply with the guidelines of the Health and Safety Executive: Legionnaires disease: http://www.hse.gov.uk/legionnaires/ ". - Provision of fresh, clean drinking water: chilled water dispensers or taps in all rest areas, kitchenettes for building users (workers).
Ene	**01**	**Energy efficiency-option 1**	Determination of the energy performance of the building in the design phase according to local regulations by a qualified energy expert (including operating energy demand, primary energy use, total CO2 emissions).
Ene	**02a**	**Energy monitoring**	

		Sub-metering of major energy-consuming systems	An energy monitoring system is set up, covering 90% of the building's annual consumption monitoring. Major energy consumers' (heating, HMV, cooling, ventilation, humidification, lighting + power transmission, other large consumers), sub-metering in BMS.
		Sub-metering of high energy load and tenancy areas	With sub-meters that can be connected to BMS, energy consumption must be measured separately per tenant, per building level and per building relevant functions (warehouse and office) (electricity - cooling, air ventilation, lighting, etc., heat - heating, HMV)
Ene	**03**	**External lighting**	Use of energy-efficient luminaires in outdoor areas of the facility (light output ≥60 lm / W) that can be switched on automatically and use of sensors in pedestrian zones.
Ene	**08**	**Energy efficient equipment**	Use of energy-saving appliances in offices, server rooms and kitchens.
Tra	**01**	**Public transport accessibility**	Calculation of the BREEAM accessibility index based on the distance of each mode of public transport from the main entrance and the frequency of each mode of transport.
Tra	**03a**	**Alternative modes of transport**	
		Alternative modes of transport	Establishment of facilities for the use of low-carbon modes of transport (cycling infrastructure, electric charging station (car), making buses more frequent, services that offer car rides).
		Exemplary performance requirements	Implementation of at least two of the Tra 03a credit options in the building.
Tra	**04**	**Maximum car parking capacity**	Reducing the number of parking spaces, depending on the availability of public transport.
Tra	**05**	**Travel plan**	Preparation of a travel plan with traffic analysis for the site.
Wat	**01**	**Water consumption**	Reduction of water consumption by using water-saving equipment and water recycling systems. Water equipment with the following water consumption values (or lower) can be installed: - WC - 4.5 / 3 liters / flush - urinal - 1.5 liters / flush - washbasins (sinks) - 4 liters / minute - showers - 7 liters / minute - hand wash (kitchenette) - 4 liters / minute - dishwasher - 9 liters / cycle
		Exemplary performance requirements	At least 65% used water saving compared to BREEAM default values.
Wat	**02**	**Water monitoring**	Water consumption is measured in the buildings.
Wat	**03**	**Water leak detection and prevention**	
		Leak isolation	Each tap, shower, larger water systems (eg central HMV) and household water consumers (dishwasher) have a separate shut-off valve and can be disconnected from the system in the event of a failure.
Mat	**01**	**Life cycle impacts**	
		Life cycle assessment	A life cycle assessment is prepared using an LCA database appropriate to the main structural elements of the building to ensure that low environmental impact materials throughout the lifespan of the building are installed.
		Environmental product declarations (EPD)	EPD declarations for at least 5 products
		Exemplary performance requirements	EPD declarations for at least 10 products
Mat	**03**	**Responsible sourcing of materials**	All timber used is from a legal source.

		Sustainable procurement plan	Creating an environmentally conscious procurement plan
		Responsible sourcing of materials	
		Exemplary level criteria	
Mat	**05**	**Designing for durability and resilience**	The structures of the building and the outdoor spaces subject to increased stress have a durable, resistant design - pedestrian traffic areas - motor vehicles and transport of goods within the building - the external façade of the building where there are motor vehicles or goods are transported
Mat	**06**	**Material efficiency**	Assessment of building material efficiency by value engineering methods in all project phases
Wst	**01**	**Construction waste management**	
		Construction waste reduction	Setting goals for the amount of waste generated, monitoring, examining the recyclability of the generated waste in case of (partial) demolition of an existing building.
		Construction waste reduction	For recycling at least 5 construction waste streams on or off site.
		Diversion of resources from landfill	A significant part of the amount of non-hazardous demolition and construction waste (at least 75% by weight or 65% by volume) is not landfilled, but is recycled on-site or off-site.
		Exemplary level criteria	At least 75% by weight or 65% by volume of the demolition and construction waste generated shall be recycled in a verifiable manner.
Wst	**02**	**Recycled aggregates**	Use of at least 25% recycled or secondary aggregates.
		Exemplary performance requirements	Use of at least 50% recycled or secondary aggregates.
Wst	**03a**	**Operational waste**	Development of selective waste collection infrastructure in the building. Installation of a waste compactor in case of large waste generation; composting or compostable waste storage in case of organic waste generation, with water intake
Wst	**05**	**Adaptation to climate change**	
		Adaptation to climate change – structural and fabric resilience	Before the end of the concept design phase, an adaptation strategy in case of climate change for the resilience of building materials and structural elements needs to be developed. The strategy shall use risk analysis to take into account the extreme weather conditions caused by climate change.
		Exemplary performance requirements	By meeting the relevant requirements of Hea 04, Ene 01, Ene 04, Wat 01, Mat 05 and Pol 03.
Wst	**06**	**Functional adaptability**	A building-specific strategy involving the future functional adaptability of the building is prepared in accordance with BREEAM requirements.
LE	**02**	**Ecological value of site and protection of ecological features**	
		Ecological value of site	The construction site is of low ecological value (as determined by BREEAM criteria or an ecological expert).
		Protection of ecological features	Adequate protection of all areas of ecological value surrounding the construction site during construction.
LE	**04**	**Enhancing site ecology**	

		Ecologist's report and recommendations	An ecological report prepared by a suitably qualified ecological expert (at the latest at the concept design phase) after a site visit, with recommendations for increasing the ecological value. A minimum of 50% of these proposals are to be incorporated into the plans.
		Increase in ecological value	A minimum of 75% to 95% of the recommendations of the ecological expert are incorporated into the plans.
LE	**05**	**Long term impact on biodiversity**	Prior to the start of construction, an ecological expert is appointed to check compliance with local, national and international regulations for the protection of ecological values. A landscape and habitat protection plan is prepared for the plot with measures for a minimum of 5 years. 2 or 4 of the following are met: - appointing a person responsible for the protection of ecological values during construction - training of construction workers to prevent ecological damage, monitoring measures taken to protect ecological values with construction milestones - creating a new community with significant local ecological value - avoiding disturbing existing wildlife during construction - design team collaboration with local environmental or other relevant civil society group.
Pol	**01**	**Impact of refrigerants**	All systems with an electric compressor comply with EN 378: 2008 or ISO standard 5149: 2014.
		Impact of refrigerant Direct Effect Life Cycle CO_2 equivalent emissions Global Warming Potential (GWP)	Depending on the type of coolant (low global warming potential, GWP <10 or determined by detailed calculation) max. 2 credits can be earned.
		Leak detecion	In connection with the building's refrigerators, a leak detection and automatic drainage system is set up, which is activated in the event of a refrigerant leak.
Pol	**02**	**NOx emissions**	Minimization of dry nitrogen oxide emissions from the building heating and HMV system (≤ 56 mg / kWh).
Pol	**03**	**Surface water run-off**	
		Flood resilience	Based on the flood protection maps, the site is located in a low flood risk area and this is confirmed by a flood protection risk analysis prepared for the site, which covers all possible flood sources (surface, groundwater, canal).
		Surface water run-off, peak rate run-off	Based on the flood protection maps, the site is located in a low flood risk area and this is confirmed by a flood protection risk analysis prepared for the site, which covers all possible flood sources (surface, groundwater, canal).
		Surface water run-off, run-off volume	In the case of precipitation, the maximum rate of rainwater leaving the area due to the rainwater drainage system (peak rate run-off) is not higher than before the investment (study simulated for rain with a probability of return of 1 and 100 years, taking into account climate change)
		Minimising watercourse pollution	Sustainable rainwater drainage systems (eg drainage ditches) in low-risk areas; oil separators in high risk areas (car parks, roads, mechanical terraces)
Pol	**04**	**Reduction of night time light pollution**	The external lighting and light sources meet the requirements of BREEAM, the lighting operates with a timer and reduced brightness after 11 pm.

Pol	**05**	**Noise attenuation**	Preparation of an assessment in order to minimize noise pollution; the operational noise (mechanical) from the new facility can only slightly exceed the pre-development condition.

3.7. Step by Step description of the implementation for a LEED rating

Presentation of the LEED certification

LEED (Leadership in Energy and Environmental Design) is also an internationally recognized but American certification system. Its system of criteria greatly overlaps with BREEAM; its main topics are: location and transport, sustainable land development, water efficiency, energy and atmosphere, sustainable building materials, indoor environment quality.

During a LEED certification, just like with BREEAM, each project to be certified must meet a set of prerequisites, and the compliance with additional criteria (credits) determines the total score, which results in a Certified, Silver, Gold or Platinum certification level.

Most of the targeted credits can be met with appropriate architectural and professional planning, but there are some that are the responsibility of the investor to certify and many that are related to construction.

An outstanding number of points can be achieved in the LEED certification with good energetics, which must be examined in all cases with dynamic energy modeling.

In the case of newly built projects, the two-stage certification procedure is possible here as well, in which the design-level (Design Review) and post-construction compliance materials (Construction Review) are submitted.

Although the LEED certification can be conducted without an accredited certification license, due to the complexity of the system, it is always recommended to include a LEED assessor.

LEED is primarily based on American standards, which is often a challenge for designers. In newer versions of LEED, it is increasingly opening up to the applicability of international standards, including many European standards.

Maintaining a LEED certification

The sustainability performance of a building, like BREEAM, is examined by LEED only once after handover. If the building obtains the certification, this applies to the entire lifespan of the building, no further audits are required to “maintain” the certification.

Partners involved

To obtain a LEED certification, the following partners are usually required to work together:

- Investor,
- Architects and professional designers (mainly building engineering, electricity, BMS, landscape architecture, utilities, transport),
- Contractor(s),
- LEED consultant and assessor and
- Additional specialists, depending on the developed credit strategy (eg energy modeling specialist, lighting modeling specialist, control specialist).

Chronological description of the certification, time-critical elements

The LEED consultant should be involved in the project already in the project preparation phase. The primary reason for this is that there are time-critical credits that can only be completed in the initial phase of the project (eg "simple-box" energy modeling). In addition, it is also advantageous from the point of view of the certification, because the earlier the credit strategy is completed (ie how the building will be able to achieve the set certification level), the more economically it is possible to go through the certification procedure.

Key milestones in the rating:

- Pre-certification, compilation of credit strategy
  - defining the target certification level and the necessary credit strategy in cooperation with the investor
  - as soon as possible, optimally already in the project preparation phase
- Design in line with targeted LEED requirements
  - from concept design to construction plans
- Optional step during the design phase: LEED Design Review certification
  - examination of so-called design credits based on current plans
  - the lead time is approx. 3-6 months, the end result is an intermediate LEED certification
- Development in accordance with targeted LEED requirements
  - with special regard to waste management, the use of materials from responsible sources, appropriate pollution protection measures during construction
- Completion works and handover of buildings in accordance with targeted LEED requirements
  - with special regard to the adjustment of mechanical and electrical systems
- LEED Construction Review certification
  - on the basis of the realized state, primarily the examination of the so-called construction credits
  - the lead time is approx. 3-6 months, the end result is a final LEED certification

3.8. Cost and emission effects

In order to present the environmental and economic parameters of the non-certified and certified warehouses, we selected one warehouse from both categories together with the FBL, on which we performed the assessment based on the provided control-assessment methodology. The selected warehouses were ArcelorMittal's uncertified warehouse and FBL's own E2 LEED-certified warehouse.

3.8.1. Emission effects

In the assessment of emission effects, the use of electricity, tap water and natural gas was taken into account. After entering the raw data, the obtained template automatically calculated the various indicators, which are presented in the following tables:

There are several limitations in the provided data:

The Arcelor building and E2 warehouse numbers are listed in the table. There can be several reasons for each discrepancy:

- the high volatility of the HUF-EUR exchange rate has changed the annual unit prices in the recent period, even if there was no change in the Hungarian price.
- Public service fee training may differ from country to country. In Hungary, various network / commercial / dealer fees are added to the base price, so the price of 1 kWh of electricity is almost doubled.
- The price of drinking water cannot be interpreted in itself. It is already included in the table, but the fee for wastewater (which is derived from the amount of drinking water) is also closely related to this.
- The Arcelor building is an unheated, industrial warehouse with only lighting and cranes. In winter, they work in coats with gates open all the time. In E2, on the other hand, both tenants heat to 15-18 degrees Celsius, as they have a webshop and archive with a multi-level shelving system, a 24-hour camera and an IT network.

In our opinion, the different use has a greater impact on the calculated final results than whether or not the hall was certified.

Warehouse data	Arcelor(Non-certified)			E2(LEED certified)		
	2017	2018	2019	2017	2018	2019
Gas usage per year in kWh	547 215 165	508 339 548	141 698 184	163 673 229	459 788 030	486 697 784
Electricity usage per year in kWh	263 292	292 574	291 344	280 481	665 871	739 307
Water usage per year in m³	230	265	318	331	1 060	875

Calculation of energy consumption in kWh/m²						
	Arcelor(Non-certified)			E2(LEED certified)		
Years	2017	2018	2019	2017	2018	2019
Energy consumption kWh	263 292	292 574	291 344	280 481	665 871	739 307
Area in m²	11 000	11 000	11 000	11 960	11 960	11 960
Energy consumption in kWh/m²	23,94	26,60	26,49	23,45	55,68	61,82

Calculation of standardised energy consumption in MJ/m² - Electricity						
	2017	2018	2019	2017	2018	2019
Electrcity consumption in kWh/m²	23,94	26,60	26,49	23,45	55,68	61,82
WTW energy factor in MJ/kWh	3,249	3,249	3,249	3,249	3,249	3,249

Calculation of standardised energy consumption in MJ/m² - Gas						
	2017	2018	2019	2017	2018	2019
Gas consumption in kWh/m²	49746,83	46212,68	12881,65	13685,05	38443,82	40693,80
WTW energy factor in MJ/kWh	3,249	3,249	3,249	3,249	3,249	3,249

Calculation of greenhouse gas-emissions in kgCO2e/m² - Electricity						
	2017	2018	2019	2017	2018	2019
Engery consumption in kWh/m²	23,94	26,60	26,49	23,45	55,68	61,82
WTW emission factor in kgCO2e/kWh	2,88	2,88	2,88	2,88	2,88	2,88

Calculation of greenhouse gas-emissions in kgCO2e/m² - Gas						
	0	0	0	0	0	0
Engery consumption in kWh/m²	49746,83	46212,69	12881,65	13685,05	38443,82	40693,80
WTW emission factor in kgCO2e/kWh	2,88	2,88	2,88	2,88	2,88	2,88

3.8.2. Costs

In the course of the analysis, we have also reviewed the main financial indicators for buildings for the years 2017-2018-2019, for which the data were provided by the FBL.

Total-Cost-of-Ownership		
General Parameters	Arcelor(Non-certified)	E2(LEED certified)
Acqusition or Construction costs	5 600 000,00 €	5 080 000,00 €
Useful life (years)	30 a	30 a
Costs for Certification	-	22000
Calculatory interest rate in % p.a.	2%	2,5
Depriciation	2%	2%

Fixed Costs p.a.	Arcelor(Non-certified)			E2(LEED certified)		
Year	2017	2018	2019	2017	2018	2019
Acquisition costs	186 666€	186 666€	186 666€	169 333€	169 333€	169 333€
Costs for Certification	- €	- €	- €	22 000€	- €	- €
Capital costs						
Warehouse	47 600€	47 600€	47 600€	6 350 000€	6 350 000€	6 350 000€
Certification	- €	- €	- €	27 500€	27 500€	27 500 €
Depreciation						
Warehouse	112 000€	112 000€	112 000€	101 600€	101 600€	101 600 €
Certification	- €	- €	- €	- €	- €	- €

Variable Costs p.a.	Arcelor(Non-certified)			E2(LEED certified)		
Year	2017	2018	2019	2017	2018	2019
Energy (Electricity, Heat, …) in €	42 126€	46 811€	46 615€	44 876€	79 904€	88 716€
Water costs in €	190 900€	172 250€	190 800€	274 730€	689 000€	525 000€

	Arcelor(Non-certified)			E2(LEED certified)		
TCO	2017	2018	2019	2017	2018	2019
TCO in €/year	579 293€	565 328€	583 681€	6 990 040€	7 417 337€	7 262 150€
TCO in €/m²	52,66 €	51,39 €	53,06 €	584,45 €	620,18 €	607,20 €
Variable costs in €/year	233 026€	219 061€	237 415€	319 606€	768 904€	613 716€
Variable costs in €/m²	21,18 €	19,91 €	21,58 €	26,72 €	64,29 €	51,31 €
Fixed costs in €/year	346 266€	346 266€	346 266€	6 670 433€	6 648 433€	6 648 433€
Fixed costs in €/m²	31,48	31,48	31,48	557,73	555,89	555,89

3.8.3. Summary – costs and emission effects

The certification of buildings on the basis of their environmental impact cannot be carried out or assessed solely on the basis of economic factors. Protecting the environment is never cheap from an economic point of view, but we are protecting our future by avoiding building real estate that are built or operated in unnecessarily wasteful ways. Environmental protection has never been about how a building can be cheaper. It is about how we can protect and preserve the existing environment during developments and how we can reduce our current and future ecological footprint. Development cannot be stopped, but we not only can, but must strive to reduce its harmful consequences.

The LEED or BREEAM certification is not cost reduction, but a ‘brand’. A building will not be better or cheaper to operate because it has a certification. It will be better because when deciding the function, during design, when selecting the appropriate materials and technology and during development, we find the reasonable balance among the goal / function vs. costs vs. overall environmental burden. The LEED and BREEAM rating systems provide the background and guidelines for finding this balance.

We believe that in the near future, the environmental performance rating of buildings will be the same minimum requirement for large companies with adequate capital and social responsibility during an expansion, development or relocation as it is today an ISO or HACCP

certification in the day-to-day operation. After a time, it will not be possible to enter a certain circle not only without monitoring the system regulating the operation of the company, but also without monitoring the real estate stock owned / leased by the company. In today's real estate market, it seems that during the sales of more expensive buildings with higher technical content, certification is much more expected and much more widespread than in the case of industrial properties that fully meet the stated goals, but with lower technical content due to the function. Even though practically every office building in Hungary that has been completed in the last 5 years has been certified, in the industrial / logistics market BSZL Zrt. was the first to certify the C1 building in 2016, and even since then it is not the case that other industrial real estate developers have started to use in great volume the LEED / BREEAM certifications during the development of their new properties.

It can also be stated that there is no real basis for post-certification in Hungary for buildings older than 5-10 years, as the technical content of buildings developed according to previous construction standards (eg thickness of thermal insulation, lack of internal utility network sharing, etc.) differs so much from the equipment and networks in today's buildings that they cannot be carried out economically. It is hard to imagine a greater waste than throwing away a working system just to install a device that is more energy-efficient by one or two classes. Certification is worth considering for building owners if the mechanical and electrical systems have served their lifespan and they would like to renovate the building under the new approach.

It should also be emphasized that in the case of the three buildings in the Port area of similar age and technical content presented, it is not possible to draw a uniform conclusion after obtaining the certification that the certified building consumes less energy or is more environmentally conscious. The building's energy requirements are greatest due to the function (it is not possible to save on cooling if I store chocolate and in a crossdock warehouse it is not possible to prescribe that the gates must be kept closed for a minimum of 16 hours) and user habits (still the easiest and fastest way of reducing costs is if I turn off the lights). However, with the certification, we can find the optimum balance so that our wallet can handle it, but we can still take a light walk with a calm conscience, eg on the banks of the Danube, which is part of Natura2000.

3.9. Lessons Learned and Experiences

For the acquiring of BREEAM/LEED certification, a Sustainability Consultant has been appointed for the projects (Óbuda-Újlak Zrt.). The following measures have been implemented during the development in order to acquire the certification:

All designers and contractors had to comply with the requirements set in the credit strategy, and shall provide data about the fulfilment of the requirements during design, construction and handover.

The best is if the preliminary BREEAM/LEED credit list is supplied as an appendix of the design and construction contract(s). The contractor could propose other credits, ensuring that enough points have been attempted at the certification process.

To provide the above, the appointed BREEAM/LEED consultant helped the design and construction process as a consultant of the Developer from the beginning –monitoring credit compliances, and giving any necessary feedback both to each involved party and the Owner of the project. The BREEAM/LEED consultant also made sure that every credit had its own

responsible party, and that they were well aware of their actual task and understand them completely.

Most of the challenges came from the fact that while the number of green building certifications is constantly increasing in Hungary, the green building rating system requirements are still not as widespread as it is in more advanced countries. Therefore, it was one of the main goals to deal with those environmental issues that are unique in the country, with this making the certification system more familiar to the participants. Since the location of the investment was not easy to reach, the capacity of the public transportation had not been sufficient, and so solving the transportation was one of the biggest challenges of the project.

Energy efficiency is one of the key aspects of sustainability nowadays, therefore during design, attention was given to keep in mind this aspect to an extent which is allowed by the current project budget, and to provide future opportunities to later developments.

Due to these rating systems are not known widely the requirements had to be communicated numerous times to make sure that the project members were keeping them in mind and none of the details were missed. However, as the project was developing, the team members adapted to these previously unfamiliar ideas and aspects, and it became a focus point that everybody was paying attention to.

Recommendations

In discussions with industry players, we have identified several good practices that can support the proliferation of green certifications in the industrial real estate market. Based on expectations, as long as there is no change in the regulatory environment, it will be many years before market mechanisms make the certification of warehouses and production halls as general a standard as it is today in the office real estate market.

Recommended good practices for adoption:

- Providing easements for newly built properties that are certified or are in the process of obtaining a certification during property licensing procedures.
- Investments with a green certification (ie targeting it) receive an easement on site coverage regulations if they meet the conditions.
- Banks should favor investments that plan on obtaining green certifications in terms of funding, they can even set as a condition that they support only such projects. Elsewhere, with a similar logic, green investments receive certain conditional reliefs and discounts.

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