
Özden Demir¹ (Author)
¹Istanbul Technical University / Eindhoven Technology University (exchange program)
Student no: 0822968  e-mail: o.demir@student.tue.nl
Advisors: Prof. Dr. A. Zerrin YILMAZ, Prof. Dr. Jan HENSEN, Dr. Daniel COSTOLA

SUMMARY
Today there is a conflict between the terms “green building” and “green certified building”. Green buildings minimize the influence of buildings to environment and provide better working and living spaces. Green building certification systems appraise a building's green performance and affirm its green building status through frameworks and targets to achieve a green building. The main purpose of the research is to analyze and clarify the green building and the green building certifications issues in the building market. Specifying the main problems in the market regarding to these issues and trying to produce proper solutions to the problems is one of the main purposes of the research. In the research a case study building is used in analyzes with building performance simulation tools and also assessed in the Netherlands’ building market as well as in the Turkish one. The green building certification score and credits are reviewed critically. Besides interviews and questionnaires are made with the stakeholders and their opinions regarding to the green building certifications are considered.

INTRODUCTION
The increasing world population has been making the built environment wider and bigger day by day. Worldwide the buildings consume 40% of the total energy; the U.S., Russia and the European countries [1]. The researches show that CO2 emissions in developed countries grew more than 20% in 60 years and the global warming danger as well [2]. To stop the dangerous influences of built environment the ”green” phenomenon is supported in building market. Green buildings have three essential effects on environment and people: Energy, water and resource efficiency, improvement in user health and productivity, and reducing waste, pollution and environmental defilement [3]. Green building certifications follow the green movement in building market to develop and assess buildings’ green performance. Today there are various green building certifications all over the world. LEED and BREEAM are the
most preferred ones. However, there are several critics regarding to the performances of green certified building and green building certifications [4], [5].

METHODS

As it is shown below schematically, the research studies proceed in two ways: green certified building and green building certifications. In the line of the green certified buildings, a case study building is examined through the building performance simulations, critical assessment of the green building certification score and the evaluation of the building in the Netherlands. In the other way, the literary researches about the green building certifications (Appendix A), critics and benefits of them and adaptation of the green building certifications. As the common survey for the both research line there is interviews and questionnaires with experts from the market in Turkey and in the Netherlands. In the end all the results and informations are gathered together for analysis, discussions and conclusions.

![Figure 1. Methodology of the research.](image-url)

One of the methods used in the research is interview and questionnaire. Through this survey, which goes through a critical review from the stakeholders in the Turkish and Dutch building market, green building certifications and their situation in the market are analyzed. From various professionalized areas totally 20 stakeholders from both countries joined to this survey and 50% percent of the survey is applied through interviews. Content of the questionnaires comprises five parts and an explanation in the beginning about the goal of the survey. In total, there are eighteen questions excluding inductor part; three of them are open questions, two of them are multiple choice, there is one rating scale question and the rest of them are single choice questions. First part of the questionnaires is introductory part about
participants. In the second part is “Green Buildings and Green Certified Buildings”, and here the attitudes of the stakeholders regarding to these terms and their judgments to green performance criteria are defined through the questions and a rating scale. The third part in the questionnaire, Credibility of Green Building Certifications, involves single choice questions with “Yes-No-I don’t know”. This part questions green building assessment methods and their effects in the market. There are two multiple-choice questions in the fourth part, Green Building Certification Process, and these questions analyzed thoughts about problems in the process and the reasons of them. The fifth part is named “Green Building Certification in the Market” and it addresses the questions about situation in the market and consideration of local characteristics (Appendix E-F-G-H).

A case study building is used in the research in order to make analysis and comparisons on a green certified building example. For this purpose a LEED-certified building is chosen and a case study building is created in a very dense area of Istanbul according to this example (Figure 2a). The case building can be defined an office building that has 14m x 62m rectangular shape, eight floors and curtain wall façade with shading system (Figure 2b).

![Figure 2. The case study building a) and a possible dense location for it b).](image-url)

Main analysis of the case study building is made using BPS-tools (Appendix B). Energy efficiency and daylight availability of the case study building are calculated through simulations. In addition, the case study building is simulated in the Netherlands in order to see results in another location/country. To calculate the energy efficiency of building a “proposed” and a “reference” building are modeled in simulation tool and then the results of these simulations are compared with each other. Proposed building means the actual building, reference building refers to a baseline building, which is specific for the actual building. In other saying, it is a version of actual building based on ANSI/ASHRAE/IESNA 90.1-2004 standard. For the reference building, U-factors of the building envelope are also taken from this standard depending to the climatic zone of the case study building location. For Istanbul,
Turkey the climatic zone is accepted as the climatic zone 3A, for Amsterdam, the Netherlands as the climatic zone 5. The HVAC system is modeled in the energy simulations as “Ideal Loads Air System”, through which energy demand of the building can be calculated.

Daylight availability analysis is another method calculated through BPS-tools. For daylight simulations clear sky model is used and the simulation is run in September 21 twice on 9 a.m. and 3 p.m. The lowest result shows daylight availability of the building. The daylight calculation is based on the percentage of building’s floor area, which has more daylight than the threshold value, to the whole floor area. This daylight threshold value is defined in the IESNA Standard as 269.098 lux and LEED also accepts this limit. As it is applied in the energy efficiency analysis, in the daylight simulations the case study building is modeled in two different locations, in Turkey and in the Netherlands and then the results are compared with LEED performance of the case study building. Besides, to point out influence of shading system on daylight availability calculation, the daylight simulations are applied on the proposed and the reference buildings, as in the reference buildings no shading system is allowed.

The last method used in the research is critical review about the awarded credits by the case study building in LEED. The aim of this survey is to analyze green performance of the certified building. Considering other information gathered in this research, the awarded LEED credits are reviewed in three groups, which are about lack of consideration about local characteristics, misapplications in construction phase and also in certification phase. In addition, these credits are compared with the similar ones in BREEAM-NL in order to see the effect of an adapted green building certification on certification score reliability (Appendix D).

RESULTS

Positive and negative effects of green building certifications

Through literary research positive and negative effects of the green building certifications are defined. From a positive approach, green building certifications are beneficial as a systematical green building assessment tool [6], which develops the green building market [7], provides easier management in green building process [8] and informs building users [5]. Beside benefits, there are many critics regarding to the green building certifications. The three main critics are insufficient performance of the green certified buildings [9], problems in the
methodology of the green building certifications [10] and lack of consideration about local characteristics [10], [11].

**Interview and questionnaire survey**

The interview and questionnaire survey has important results that should be considered. The introductory part of the survey shows that generally 80% of the stakeholders have green building experiences. Also 85% of them worked before about green building certifications. The second part has results about green building and green certified buildings. General opinions about green building are very positive, however, the most remarkable definition is “really green”, which is used by many participants. About the green certified buildings, two main opinions prevail; in general, participants from Turkey do not satisfy with the green building performance of green certified buildings and they do not trust them either. In the Dutch side people think that green certified buildings “add value” and “increase conscious” in the market more optimistically.

Highlights from the third part’s results show that certifications affect buildings’ value economically (app. 95%) and they might be misleading for building users (app. 80%). Also most of the participants are agreed that green buildings and green certified buildings do not mean the same (app. 85%). Besides, participants doubt about the green certified buildings’ performance (app. 65%) and assessment method of green building certifications (app. 60%). According to the fourth part results, which deals with the problems in the green building certification process and their reasons, the participants think that problems mostly occur in usage and construction period of a building (Figure 3a). Also in their aspect the possible reasons for these problems are lack of knowledge, costs, lack of control and disinterest (Figure 3b). The green building certifications in market is analyzed in the fifth part and results show that 70% of the stakeholders think that the green building certification practices are not good enough in their countries. This is even 100% in the Turkish market, in which there is no adapted or local green building certification. However, in the Netherlands mostly an adapted green building certification is used, BREEAM-NL, and in there the rate of unsatisfied people about green building practices is 40%.
Energy simulations in Turkey and in the Netherlands

According to the energy simulation results in Turkey, energy demand of the proposed building is 73,56 kWh/m² and annually 1,060,803,32 kWh. 178,771,70 kWh of this amount is needed for heating, 348,662,28 kWh for cooling and 533,369,34 kWh for interior lighting and equipment. Reference building energy simulation results that the annually energy demand of the building is 78,00 kWh/m² and 1,124,760,77 kWh. It requires 301,674,06 kWh for heating, 288,205,76 kWh for cooling and 534,880,95 kWh for interior lighting and equipment per year. Table 1 shows that energy demand of different end uses in the proposed and the reference building in Turkey.

In the Netherlands the annual energy demand of the proposed building is 69,71 kWh/m² and 979,169,81 kWh. 313,726,76 kWh of that is needed for heating and 132,073,71 kWh for cooling of the case study building. In addition, the electrical energy demand for lighting and various equipment results 533,369,34 kWh in a year. The result of the reference building energy simulation is annually 73,90 kWh/m² and 1,065,644,65 kWh. The reference building has 428,564,62 kWh heating demand, 102,199,08 kWh cooling demand and 534,880,95 kWh electricity demand for lighting and equipment. Table 1 shows that energy demand of different end uses in the proposed and the reference building in the Netherlands.

Table 1. Energy demand of the proposed building in Turkey.

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<tr>
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</thead>
<tbody>
<tr>
<td>Heating</td>
<td>12,40</td>
<td>20,92</td>
<td>21,76</td>
<td>29,72</td>
</tr>
<tr>
<td>Cooling</td>
<td>24,18</td>
<td>19,99</td>
<td>9,16</td>
<td>7,09</td>
</tr>
<tr>
<td>Lighting</td>
<td>17,23</td>
<td>17,33</td>
<td>17,23</td>
<td>17,33</td>
</tr>
</tbody>
</table>
The comparison between proposed and reference buildings’ energy demands gives energy efficiency of the building. Totally, the case study building simulated in Turkey is 5.7% energy efficient according to these results. Figure 4a) presents that energy efficiency of end uses are not in the same proportion. Although the building’s heating is approximately 41% energy efficient, cooling system requires 21% more energy. In the Netherlands, when the energy simulation results of the proposed and reference building are compared, the energy efficiency results as 7.6%. The energy efficiencies in different end uses are 21.3 in heating and -5.6% in cooling of the building. According to Figure 4a) and 4b) the energy efficiency rates of the case study building are consistent in Turkey and in the Netherlands. Differences regarding to heating and cooling loads can be explained with different climatic conditions on these two countries and different building envelope values on ASHRAE standard for the different climate zones.

Daylight simulations in Turkey and in the Netherlands
The daylight simulations in Turkey show that the case study building has substantially few daylight availability. In proposed building model the floor area with daylight above threshold is 3.65% of the whole floor area of the building spaces with windows. The highest level is in entrance on the ground floor, however, on the other floors of the building there is almost no daylight. In the reference building model, which has no shading system, the daylight

<table>
<thead>
<tr>
<th>Equipment</th>
<th>19.76</th>
<th>19.76</th>
<th>19.76</th>
<th>19.76</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL</td>
<td>73.56</td>
<td>78.00</td>
<td>69.71</td>
<td>73.90</td>
</tr>
</tbody>
</table>

Figure 4. Energy demand distribution in Turkey a) and in the Netherlands b).
availability results as 28,46% (Table 2). Also the results show that without shading system the building floors have 32% daylight availability.

In the Netherlands daylight availability results of the case study building are higher relatively to the results in Turkey. The daylight availability is 14,41% in the proposed building model and 78,86% in the reference building model (Table 2). The absence of shading system affects the daylight availability result more in here. Without it the building floors have approximately 83% daylight.

**Table 2.** Daylight availability (%) of the case study building in Turkey and in the Netherlands.

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Basement 1st</td>
<td>8,75</td>
<td>9,37</td>
<td>12,15</td>
<td>11,69</td>
</tr>
<tr>
<td>Ground floor</td>
<td>86,28</td>
<td>87,39</td>
<td>73,74</td>
<td>72,73</td>
</tr>
<tr>
<td>Mezzanine floor</td>
<td>5,75</td>
<td>6,73</td>
<td>28,50</td>
<td>96,99</td>
</tr>
<tr>
<td>1st floor</td>
<td>0</td>
<td>22,55</td>
<td>0</td>
<td>81,59</td>
</tr>
<tr>
<td>2nd floor</td>
<td>0</td>
<td>23,79</td>
<td>0</td>
<td>82,47</td>
</tr>
<tr>
<td>3rd floor</td>
<td>0</td>
<td>28,95</td>
<td>0</td>
<td>82,60</td>
</tr>
<tr>
<td>4th floor</td>
<td>0</td>
<td>30,47</td>
<td>0</td>
<td>86,31</td>
</tr>
<tr>
<td>5th floor</td>
<td>0</td>
<td>29,88</td>
<td>0</td>
<td>81,22</td>
</tr>
<tr>
<td>6th floor</td>
<td>0</td>
<td>32,51</td>
<td>0</td>
<td>83,70</td>
</tr>
<tr>
<td>7th floor</td>
<td>0</td>
<td>38,23</td>
<td>0</td>
<td>80,28</td>
</tr>
<tr>
<td>8th floor</td>
<td>0</td>
<td>48,89</td>
<td>0,09</td>
<td>85,83</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>3,65</strong></td>
<td><strong>28,46</strong></td>
<td><strong>14,41</strong></td>
<td><strong>78,86</strong></td>
</tr>
</tbody>
</table>

**Critical review about awarded credits in LEED and comparison with BREEAM-NL**

The first group of credits is analyzed related with their consideration about local characteristics. Totally seven credits are reviewed in this group that are about site selection, development density, bicycle usage, low-emitting vehicles, storage of recyclables and tobacco smoke control. Through interpretation of these credits it is seen that their assessment aspect and requirements are not appropriate for Turkish culture, life style and conditions. Explaining briefly, Turkey is a country in which there are not many virgin lands, the cities are generally very crowded and dense, there is not common bicycle usage and substructure for that habit, low-emitting vehicles are used very few, recyclable management is not prevalent and tobacco smoke is already forbidden in enclosed spaces. Overall these criticized credits are valued at four points and two prerequisites; so they can be described as almost 16% of whole
certification. When the similar critical review is made in the Netherlands on the case study building using BREEAM-NL, the credits about site selection, development density, bicycle usage, low-emitting vehicles and storage of recyclables find meaning because of their proper assessment method based on the Netherlands’ conditions. Also there is no tobacco smoke control credit in BREEAM-NL, because there are already so many restrictions about smoking, like in Turkey.

Credits that are criticized because of misapplications in construction phase create the second group. In this group there are four credits related with construction activity pollution prevention, commissioning, construction waste management, IAQ management during construction. The result, which comes through the analysis of these credits, is that these credits can’t provide a proper assessment because of the faults of contractors or workers in construction phase. As there is not enough control about the assessment of these credits, mostly the related applications and decisions are made by unconscious and ignorant contractors. Also uninformed workers are responsible for misapplications when the control is insufficient. Totally the criticized credits in this group are worth as four points and a prerequisite, this makes approximately 10% of whole certification. Same critical review in the Netherlands with BREEAM-NL shows that the credits related with construction process do not ensure a better assessment. They are mostly like the ones in LEED, however, the general assessment method of BREEAM using its own assessors is better to have more control on applications and assessment.

There are only two credits criticized in the last group, which deals with the problems in certification process, however, these credits are relatively more important for building performance. One of them is about energy efficiency and the other one is about daylight availability of buildings. When the case study building’s LEED performance about energy efficiency and daylight availability is compared with the simulations results of the research a big differences appear. In LEED the case study building has four points with 35% energy efficiency and 24% cost optimization. However, the energy simulation results in the research show that the case study building’s energy efficiency in 5,7% in Turkey and 7,6% in the Netherlands. Figure 5a) presents the big difference between the LEED and research results. The same situation is also discussed about daylight availability results. As it can be seen from Figure 5b), the LEED result claims that the case study building has 96% daylight, however, the daylight simulations result much less as 3,65% in Turkey and 14,41% in the Netherlands.
This situation is mostly because of the used assessment method, in which shading system, surrounding buildings and sun angles are almost not considered.

Figure 5. Results comparisons between LEED and research about energy efficiency a) and daylight availability b).

Names and units
LEED : Leadership in Energy and Environmental Design
BREEAM : Building Research Establishment’s Environmental Assessment Method
BPS-tool : Building performance simulation tool
TR : Turkey
NL : The Netherlands
HVAC : Heating, ventilation, and air conditioning
IAQ : Indoor air quality
kWh : kilowatt-hour

DISCUSSION
The research studies are concluded with three main results, which are insufficient performance of green certified buildings, problems in the assessment method of green building certifications and lack of consideration of local properties. There are critics and doubts about green performance of certified buildings, which can be seen from literary sources and interview/questionnaire survey. Also analysis through awarded credits and simulations reveals that green certified buildings might present less performance than it is claimed in the certification score. Regarding the assessment method of green building certifications the stakeholders from the building market mostly think that there are problems in the process. The outcomes from critical review point out that there might be problems in construction and certification phases and these problems might influence the green
performance of the building. Through misapplications, ignorance or lack of control many credits can be seem like awarded and building can have high certification score, although the building performance is not that much. The lack of consideration about local characteristics is one of the critics regarding to green building certifications and the importance of these situation is pointed out by the participants of interview/questionnaire survey. Also the comparison between the criticized credits in LEED regarding to this issue with BREEM-NL shows that an adapted green building certification might influence green building certification score and make certification scores more reliable and correct. All the critics and negative results about green building certifications and green certified buildings are actually an important opportunity to solve the problems and to develop the green building market in the future.

REFERENCES

APPENDICES

APPENDIX A: LITERARY RESEARCH

Green Building Certifications

Green building certifications lead building projects to achieve green performance and affirm their green building status. Vandervelde and Waters (2010) point out that the green building certifications consist frameworks to develop and assess buildings’ green performance [12]. They also state that green building certifications affect demand and recognition in the market
positively. Ideally beginning from the design phase of the building these green building certifications are followed performing requirements in the frameworks as much as possible. In the end of whole certification process, the building qualifies a green building certification score depending its performance. The green building certification score is like the building’s green performance identity in the market and informs investors, users and tenants. Although common aims regarding to developing green building market, green building certifications have different assessment methods and progresses [13]. Worldwide various green building certifications have been using since the end of 20th century. LEED and BREEAM are the most famous ones.

**LEED (Leadership in Energy and Environmental Design)**

LEED is the dominant green building certification in the U.S. market, but also one of most prevalent and preferred green building certification in the world building market. It is created in 1998 by USGBC, the U.S. Green Building Council [14]. Beginning from 2008 GBCI, the Green Building Certification Institute, continue to develop LEED certification [15]. The current LEED certification, LEED Version 3.0 was launched in 2009. According to the statement of USGBC the next version of LEED, LEED Version 4.0, will be presented to the market in 2013 [14]. Since 1998, 13,000 buildings from 144 different countries all over the world are certified with LEED and almost 26,000 buildings are registered for the green building certification [14]. All LEED certification systems assess buildings according to the credits in five specific environmental areas, however, there are several bonus credits, which are included in these two categories of Innovation in Design and Regional Priority [16]:

1. Sustainable Sites
2. Water Efficiency
3. Energy and Atmosphere
4. Materials and Resources
5. Indoor Environmental Quality

The simple point system in LEED defines certification score depending on the performance about credits. Each credit has only one static value as minimum one point and there is no negative value in the system [13]. The “prerequisite” credits in LEED provide minimum standards and it is necessary to succeed those credits in order to have certification. Maximum a hundred points are able be awarded maximum from the 5 essential LEED categories; in
addition to that there may be plus six points from Innovation in Design and four points from Regional Priority. The awarding of LEED certification is leveled in four classes [16]: Certified (40–49 points), silver (50–59 points), gold (60–79 points) and platinum (80 points and above). Different types of LEED certification programs exist in order to assess properly various type of building. There eight certification systems under the title of LEED, which are: LEED for Core & Shell, LEED for New Construction, LEED for Schools, LEED for Neighbourhood Development, LEED for Retail, LEED for Healthcare, LEED for Homes, and LEED for Commercial Interiors [16].

After the registration with the GBCI, the USGBC helps the users about the certification tools, documents and information. Nowadays it is all done online at the website of the USGBC. For the final LEED certification, score of a building it has to be waited generally several months after the project finish [17]. The GBCI is also authoritative in all certificate applications and accreditation program for LEED Accredited Professionals (LEED AP). LEED AP’s are the technical professionals and help people during LEED process. Working with a LEED AP in this process is not compulsory, but it can be beneficial [18].

**LEED-CS (LEED Core &Shell)**

LEED for Core & Shell is a type of LEED certification, which is defined as a green building rating system for providing sustainable building criteria for uncertain developments and “core & shell” buildings. The including building elements in the term core and shell are the base building elements, like the structure, envelope, stairwells, elevators, bathrooms and utility spaces and also central electro-mechanical systems, such as HVAC. The LEED-CS considers that owner and tenant responsibility about buildings’ certain element can be different in every country’s market [19]. The individual spaces, which belong to tenant, will be built and controlled separately after the completion of building core. The LEED-CS has some special standpoints such as default occupancy counts and energy modeling guidelines [14]. One of biggest benefit of the LEED-CS is pre-registration opportunity because of the strong marketing strategy for developers and buyers [20].

**LEED 2009 for Core & Shell Development Project Checklist [16]:**

1- Sustainable Sites / 28 Possible Points

SSp.1 Construction Activity Pollution Prevention / Required

SSc.1 Site Selection / 1 Point

SSc.2 Development Density and Community Connectivity / 5 Points
SSc.3 Brownfield Redevelopment / 1 Point
SSc.4.1 Alternative Transportation: Public Transportation Access / 6 Points
SSc.4.2 Alternative Transportation: Bicycle Storage and Changing Rooms / 2 Points
SSc.4.3 Alternative Transportation: Low - Emitting and Fuel-Efficient Vehicles / 3 Points
SSc.4.4 Alternative Transportation: Parking Capacity / 2 Points
SSc.5.1 Site Development: Protect or Restore Habitat / 1 Point
SSc.5.2 Site Development: Maximize Open Space / 1 Point
SSc.6.1 Stormwater Design: Quantity Control / 1 Point
SSc.6.2 Stormwater Design: Quality Control / 1 Point
SSc.7.1 Heat Island Effect: Nonroof / 1 Point
SSc.7.2 Heat Island Effect: Roof / 1 Point
SSc.8 Light Pollution Reduction / 1 Point
SSc.9 Tenant Design and Construction Guidelines / 1 Point

2- Water Efficiency / 10 Possible Points
WEp.1 Water Use Reduction / Required
WEc.1 Water Efficient Landscaping / 2-4 Points
WEc.2 Innovative Wastewater Technologies / 2 Points
WEc.3 Water Use Reduction / 2-4 Points

3- Energy and Atmosphere / 37 Possible Points
EAp.1 Fundamental Commissioning of Building Energy Systems / Required
EAp.2 Minimum Energy Performance / Required
EAp.3 Fundamental Refrigerant Management / Required
EAc.1 Optimize Energy Performance / 3–21 Points
EAc.2 On-site Renewable Energy / 4 Points
EAc.3 Enhanced Commissioning / 2 Points
EAc.4 Enhanced Refrigerant Management / 2 Points
EAc.5.1 Measurement and Verification: Base Building / 3 Points
EAc.5.2 Measurement and Verification: Tenant Submetering / 3 Points
EAc.6 Green Power / 2 Points

4- Materials and Resources / 13 Possible Points
MRp.1 Storage and Collection of Recyclables / Required
MRc.1 Building Reuse: Maintain Existing Walls, Floors and Roof / 1-5 Points
MRc.2 Construction Waste Management / 1-2 Points
MRc.3 Materials Reuse / 1 Point
MRc.4 Recycled Content / 1-2 Points
MRc.5 Regional Materials / 1-2 Points
MRc.6 Certified Wood / 1 Point

5- Indoor Environmental Quality / 12 Possible Points
IEp.1 Minimum Indoor Air Quality Performance / Required
IEp.2 Environmental Tobacco Smoke (ETS) Control / Required
IEc.1 Outdoor Air Delivery Monitoring / 1 Point
IEc.2 Increased Ventilation / 1 Point
IEc.3 Construction Indoor Air Quality Management Plan: During Construction / 1 Point
IEc.4.1 Low-Emitting Materials: Adhesives and Sealants / 1 Point
IEc.4.2 Low-Emitting Materials: Paints and Coatings / 1 Point
IEc.4.3 Low-Emitting Materials: Flooring Systems / 1 Point
IEc.4.4 Low-Emitting Materials: Composite Wood and Agrifiber Products / 1 Point
IEc.5 Indoor Chemical and Pollutant Source Control / 1 Point
IEc.6 Controllability of Systems: Thermal Comfort / 1 Point
IEc.7 Thermal Comfort: Design / 1 Point
IEc.8.1 Daylight and Views: Daylight / 1 Point
IEc.8.2 Daylight and Views: Views / 1 Point

# Innovation in Design / 6 Possible Points
IDc.1 Innovation in Design / 1-5 Points
IDc.2 LEED Accredited Professional / 1 Point

# Regional Priority / 4 Possible Points
IDc.1 Regional Priority / 1-4 Points

BREEAM (Building Research Establishment’s Environmental Assessment Method)

BREEAM is a voluntary green building rating tool developed in 1990 by Building Research Establishment (BRE) in the United Kingdom [21]. It’s one of the most widely used green building certification in all over the world. The Building Research Establishment (BRE) is an independent and objective research center, which provides consultancy, testing and training services in building market and it leads government, industry and business about
sustainability. BRE also is the founding member of the U.K. Green Building Council [2, 21]. Globally there are more than 16,000 BREEAM certified projects, which mean more than 200,000 buildings and 115,000 of them in the U. K. More than 40,000 projects registered for BREEAM. The number of certified projects doubled between 2008 – 2012 [21, 22]. For the usage of this certification in other countries various BREEAM Schemes were created including BREEAM Europe, BREEAM Gulf and BREEAM International Bespoke [23]. BREEAM green building certification measure green performance of buildings through nine environmental categories listed below:

1. Management
2. Health and Wellbeing
3. Energy
4. Transport
5. Water
6. Materials
7. Waste
8. Land Use and Ecology
9. Pollution

Like in LEED, credits in the various environmental categories of BREEAM correspond to some points. As addition to these points, innovation credits, minimum BREEAM standards and environmental weightings. BREEAM stipulates some minimum standards in the assessment of buildings like the prerequisite credits in LEED. These standards should be achieved in order to be certified [22]. BREEAM ratings are determined by achieving a set percentage of the benchmark points. Buildings must achieve at least 30% of the benchmark to qualify. The ratings are determined as unclassified (below 30%), pass 30%- 45%), good (45%- 55%), very good (55%-70%), excellent above (70% - 85%) and outstanding (above 85% - 100%).

**Adaptation of Green Building Certifications**

The well-known green building certifications like LEED, BREEAM, etc. are used in their coutnires and in many others as well. Today lots of green building markets from various countries understand importance and necessity of a green assessment that considers local context. So, day by day, the number of developed local or adapted green building certifications increases.
Although LEED is a US-based green building certification tool, there are LEED registered buildings in 135 different countries – among these Canada, Brazil, Mexico and India. More than 50% of area of total LEED registered buildings is from the projects outside the United States LEED is improved as a green building certification by three methods and adaptation is considered as one of them [14]. Canada and India are the most important examples for the adaptation of LEED.

BREEAM is used generally in Europe and it has adapted versions in various countries like the Netherlands, Spain, Norway, Sweden and in many countries. Aubree (n.d.) mentions the advantages of BREEAM adaptation as consistency and comparability with other BREEAM certified buildings, opportunity of using national baseline and standards, cost effective assessment through local conditions, methods and practices [24]. The local green building rating system based on BREEAM can be developed from new in three ways: adapting the BREEAM UK, European or International Schemes to the local conditions, making interpretation of the BREEAM Core Technical Standard for the local conditions or using the local Scheme, which is already in existence. BREEAM-NL is one the best examples of BREEAM adaptation.

**BREEAM-NL**

The Dutch Green Building Council (DGBC) was founded in 2008 in the Netherlands aiming a measurable and developed sustainability in the building industry measurable by developing with one rating system throughout the Netherlands. Following this the building industry made first move because of the need of advertising about the sustainability level and building assessment in an accepted way worldwide. Regarding the request of the industry the DGBC searched for a green building rating model, which is able to be compared international scale, which can be adapted to the local conditions and standards like climate, building regulations. They also wanted an open and transparent certification balancing price and quality. After this process BREEAM was chosen to be the local green building crating tool in the Netherlands. In September 2009, the council formally approved BREEAM-NL 2010 Version 1.0 for new buildings for individual offices, schools, shops, industrial buildings and major renovation projects [25]. In BREEAM-NL the credit weightings are mainly unchanged, the points of Health & Wellbeing were reorganized and there are some changes to criteria to reflect Dutch legislation and regulations [24].
The list of credits in BREEAM-NL 2010 [26] (*for offices):

1. Management / 13 points
   MAN 1 Commissioning / 2 points
   MAN 2 Construction site and surroundings / 2 points
   MAN 3 Construction site impacts / 3 points
   MAN 4 User guide / 1 point
   MAN 12 Life cycle costing / 2 points
   MAN 13 Combined Credits (Man 6 - Man 11) / 3 points
   MAN 6 Consultation / 2 points
   MAN 7 Shared facilities / 2 points
   MAN 8 Security / 1 point
   MAN 9 Publication of building information / 1 point
   MAN 10 The development as a learning resource / 1 point
   MAN 11 Ease of maintenance / 1 point

2. Health & Wellbeing / 14 points
   HEA 1 Daylighting / 1 point
   HEA 2 View out / 1 point
   HEA 3 Glare control / 1 point
   HEA 4 High frequency lighting / 1 point
   HEA 5 Internal and external lighting levels / 1 point
   HEA 6 Lighting zones & controls / 1 point
   HEA 7 Natural ventilation / 1 point
   HEA 8 Internal air quality / 2 points
   HEA 9 Volatile organic compounds / 1 point
   HEA 10 Thermal comfort / 2 points
   HEA 11 Thermal zoning / 1 point
   HEA 13 Acoustic performance / 1 point

3. Energy / 25 points
   ENE 1 Reduction of CO2 emissions / 15 points
   ENE 2 Sub-metering of energy uses / 2 points
   ENE 4 Energy-efficient external lighting / 1 point
   ENE 6 Building fabric performance & avoidance of air infiltration / 1 point
   ENE 7 Energy-efficient refrigerated and frozen storage / 1 point
ENE 8 Energy-efficient lifts / 2 points
ENE 9 Energy-efficient escalators and travelators / 1 point
ENE 26 Assurance of thermal quality of building shell / 2 points

4. Transport / 12 points

TRA 1 Provision of public transport / 2 points
TRA 2 Proximity to amenities / 1 point
TRA 3 Cyclist facilities / 2 points
TRA 4 Pedestrian and cyclist safety / 2 points
TRA 5 Travel plan and parking policy / 3 points
TRA 7 Travel information point / 1 point
TRA 8 Deliveries and manoeuvring / 1 point

5. Water / 9 points

WAT 1 Water consumption / 3 points
WAT 2 Watermeter / 1 point
WAT 3 Major leak detection / 1 point
WAT 4 Sanitary supply shut off / 1 point
WAT 5 Water recycling / 2 points
WAT 6 Irrigation systems / 1 point

6. Materials / 13 points

MAT 1 Materials specification / 6 points
MAT 3 Reuse of building façade / 1 point
MAT 4 Reuse of building structure / 1 point
MAT 5 Responsible sourcing of materials / 4 points
MAT 7 Designing for robustness / 1 point

7. Waste / 7 points

WST 1 Waste management on the construction site / 3 points
WST 2 Recycled aggregates / 1 point
WST 3 Recyclable waste storage / 1 point
WST 5 Compost / 1 point
WST 6 Finishing elements / 1 point

8. Landuse and Ecology / 11 points

LE 1 Reuse of land / 5 points
LE 2 Contaminated land / 2 points
LE 3 Existing wildlife at the construction site / 1 point
LE 4 Plants and animals as co-users of the plan area / 2 points
LE 6 Long-term sustainable co-use by plants and animals / 1 point

9. Pollution

POL 1 Refrigerant GWP - Building services / 1 point
POL 2 Preventing refrigerant leaks / 2 points
POL 3 Refrigerant GWP - Cold storage / 1 point
POL 4 NOx emissions from heating sources / 3 points
POL 5 Protecting buildings from floods / 3 points
POL 6 Minimising watercourse pollution / 1 point
POL 7 Reduction of night time light pollution / 1 point
POL 8 Noise attenuation / 1 point

APPENDIX B: BUILDING PERFORMANCE SIMULATIONS

Energy Simulation and Calculation of Energy Efficiency

Building Energy Modeling (Building Energy Simulation or Dynamic Thermal Simulation) is defined by IBPSA (The International Building Performance Simulation Association, 2012) as a tool analysing the heat transfer and energy flows of buildings using annual run and weather data of buildings’ location. Generally it is used for evaluating energy demand and consumption of heating, cooling, ventilation and lighting systems in the building. Also green energy systems can be modeled and it helps by making decisions about renewable energy investments. The building performance simulation tools (BPS-tools) used in the research, Design Builder and Energy Plus, report energy demand of the case study building models and lead to calculate energy efficiency of the building. Also by these tools daylight availability of the case building can be calculated and analyzed. The main steps of modeling a building in BPS-tools can be listed as following:

1- geometrical model of the building
2- materials and construction of building elements
3- internal gains: people, interior lighting, electrical appliances
4- HVAC system
5- schedules of occupancy/living, lighting, appliances, HVAC, etc.
6- shading system
7- obstacles on the area like other buildings, trees, etc.
8- weather data of building location

To calculate energy efficiency of a building, a proposed and a reference building models of that building are required. Proposed building model refers to the model of the actual building, in this case it is the case study building. Reference building is a version of the actual building, which is represented according to baseline conditions in the standards. In the research the baseline conditions are taken from the ASHRAE standard, ANSI/ASHRAE/IESNA 90.1-2007, as LEED is based on U.S. standards and the case study building has LEED certification. Energy results proportion of the proposed and reference building models gives energy efficiency rate of the building. This is a simplified energy efficiency calculation method of green building certifications. In LEED this rate is converted to cost efficiency to define energy credit points. BREEAM also use a similar method, however, CO2 emission rates are considered in this certification.

In the research the “Ideal Loads Air System” is used as the HVAC system of the building models in BPS-tool. The Ideal Loads Air System method refers to an ideal system, which supplies air to provide thermal and ventilation requirements of the zones. Energy consumption of the system is not considered; only the energy demand of the building for heating, cooling and ventilation is calculated [27].

**Daylight Simulation and Calculation of Daylight Availability**

Daylight is very important for indoor environment quality and energy efficiency. User comfort, health, occupant performance and productivity are affected by daylight through visual quality of indoor environment. Besides proper daylight availability reduces the need of electrical lighting, so electricity savings from lighting and cooling systems are achieved [28]. To analyze the daylight availability of building, BPS-tools are used for daylight simulations. Simpkins (2012) defines daylight simulation as a way of evaluation the illuminance level of a room in building depending to sunlight directly or indirectly [29]. It leads the daylight strategies for improving visual quality and minimizing energy use.

The daylight availability is calculated best by BPS-tools. A building model, which is prepared like described above, is enough for this calculation. However, for correct results in daylight
simulation glazing properties and shading system of the building gain more importance. Also obstacles like other building or trees around building and exact weather data make the results more reliable. The clear sky mode is used for the simulations. The simulation is run on 21st of September, but on two different times of the day, which are 9 a.m. and 3 p.m. From these two results the lowest one is accepted as the daylight availability of the building. As the results of this simulation the illuminance map of building spaces and minimum daylight availability of the spaces are presented. In the illuminance map the daylighting level inside a space showed with a coloured scale.

The results of the daylight simulations are presented in Design Builder as floor area percentages of the case building. These percentages show comparison of the floor area, which has daylight minimum as the threshold value or more, with the total floor area of glazed spaced. In the tables, “Floor Area” refers to total floor area of the related spaces and “Floor Area above Threshold” means the floor area, which has more daylighting than the limit value stated in IESNA. The threshold value for daylight level is defined for LEED certification as 269.098 lux. Besides, the simulation tool gives illuminance maps of the building floor in order to show daylight grade on that space. Normally simulation with a BPS-Tool is enough for the calculation of daylight availability of a building. However, in the research proposed and reference building models are subjected to the daylight modeling in order to see the difference between these buildings and to understand the influence of shading system of the building. Because building's shading system is not considered in reference building model simulations.

APPENDIX C: CASE STUDY BUILDING

Architecture

The case study building is a green certified office building located in a very dense area of Istanbul. The building has eight above-ground floors, but also there are four basement floors, a ground floor and a mezzanine floor. The building is placed on area through East-West axis with $8^\circ$ rotation. Shape of the building is rectangle, which can be described narrow and long. There are several high buildings surrounding the case study building and the distance between the case study building and the other buildings on north and south is around 12 meter. The rectangular shape of the building plan has 14 meter length and 62 meter width. On the floor plan it can be seen elevators, stairs, sanitary spaces, technical rooms and a big office area with
an interior garden. The structure of the case study building is a reinforced concrete column – beam system. The facade of the building consists of a glazed curtain wall around office spaces on the floors; the core parts like stairs, sanitary spaces and technical rooms are closed with reinforced concrete walls. Metal shading elements and vegetation cover all the building facade as a shading system. On every floor there are interior gardens refers to a semi-exterior zone in the building, as they are protected from whole exterior wheather conditions with glazed facades, but still they have an air stream through open sides.

**Proposed Building Model of Case Study Building**

The proposed building models are prepared in Design Builder and Energy Plus BPS-tools according to properties of the case study building. The building facade is precast concrete wall at the service spaces, however, the office spaces are covered by curtain wall, in which 210cm high glazing begining after 60cm from the finished grade and the rest of it is made by insulated sandwich panels, mineral wool thermal insulation and gypsum board. The roof of building is a terrace roof, on which people can walk. The roof construction is made of reinforced concrete slab, thermal and water insulation materials, light wight concrete and gravels on the top of it. The ground floor construction refers to reinforced concrete slab, water insulation and gravel level before soil. All in all, the U-values of these building elements are:

- Exterior wall: 0,690 W/m²K
- Roof: 0,355 W/m²K
- Ground: 1,254 W/m²K
- Basement wall: 0,029 W/m²K

Glazing on the building facade is also very important. The U-value of this glazing is 1,59 W/m²K, SHGC is 0,43 and Tvis is 0,69. The shading system of the building covers all the curtain wall facade. As the shading system consists stabil metal elements and non-leaf-losing plants, it doesn not have any on/off option. On the contrary, the plants will be grow day by day increasing the shadow effect.

In the research, a simplified method is used for modelling the building's shading system, as it is very difficult to model and simulate the shading system system one by one. In this simplified method, daylight transmittance of the shading system is calculated depending to the variety in the system and these numbers are used in the BPS-tools as transparency fraction of the facade surface. As the vegetation is not same all around the building, there are three different types of surfaces: long plants, short plants and without vegetation. Calculation of the daylight transmittance of the shading elementst (for one unit on the facade) is:
For the internal gains, cooling loads from people, lighting and equipments are defined properly in the building model similarly to an office building. These internal gains come mainly from the office spaces. The number of occupants on each office floor is accepted as sixty. The internal gains per square meter are 12 W/m² for lighting and 11 W/m² for equipments in the office areas. The infiltration of the spaces, which have operable windows or doors, is entered as 0.5 ach to the building model. As the HVAC system of the building, the set-point temperatures are the main elements of the Ideal Loads Air System in the energy modeling. The defined set-point temperatures are for offices 22°C for heating and 24°C for cooling. In the sanitary spaces there is no cooling, but heating system works until 20°C. Similarly, in the main technical rooms only cooling system works and the set-point temperature is 24°C. The working hours are from 08:00 to 19:30 during the weekdays, so the operating hours of the mechanical system are from 07:00 to 20:30 during the weekdays.

Reference Building Model of Case Study Building

The reference building model of the case study building is prepared in the research according to the ANSI/ASHRAE/IESNA Standard 90.1 – 2007, as LEED certification requires this standard in assessments. For this model, the proposed building model is changed following this standard and a reference building model for the case building is achieved. First of all, the shading devices around the building are removed, as they provide a positive effect to the building according to the ASHRAE Standard. Then the U-values of the external building elements are changed to the U-values defined in the standard depending to the climate zone of the building. The climate zone of Istanbul is explained in the ASHRAE standard as 3A [30]. Besides, there are some changes about the internal gains of the building. In the reference building, lighting heat gains of spaces should be like it’s stated in the ANSI/ASHRAE/IESNA Standard 90.1 – 2007 standard. The Table 3 and 4 presents the U values and different internal gains from lighting of the proposed and the reference building model.
Table 3: U-values of the proposed and the reference building.

<table>
<thead>
<tr>
<th>U-Values [W/m²K]</th>
<th>Proposed Building</th>
<th>Reference Building</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exterior Walls</td>
<td>0,690</td>
<td>0,365</td>
</tr>
<tr>
<td>Roof</td>
<td>0,355</td>
<td>0,273</td>
</tr>
<tr>
<td>Ground</td>
<td>1,254</td>
<td>1,264 (F factor)</td>
</tr>
<tr>
<td>Basement Walls</td>
<td>0,029</td>
<td>0,678 (C factor)</td>
</tr>
<tr>
<td>Glazing</td>
<td>1,59</td>
<td>2,56</td>
</tr>
</tbody>
</table>

Table 4: Lighting heat gains of the proposed and the reference building.

<table>
<thead>
<tr>
<th>Lighting – Internal Heat Gains [W/m²]</th>
<th>Proposed Building</th>
<th>Reference Building</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offices</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Stairs</td>
<td>1,2</td>
<td>6</td>
</tr>
<tr>
<td>Corridors</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Sanitary spaces</td>
<td>25</td>
<td>10</td>
</tr>
<tr>
<td>Car parks</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

In the daylight modeling of the reference building the important issue is the shading system and the glazing. As it’s stated in the previous part about energy modeling, the reference building model doesn’t have any shading system on the building facade and the thermal conductivity of the glazing should be 1,6 W/m²K according to the ASHRAE standard. These are the changes which are related to the daylight modeling of the reference building.

**Building Location in the Netherlands**

In order to evaluate the case study building in the Netherlands it is very important to find a suitable location for the building. The suitability here can be defined as similarity with the building’s original location in respect of physical environment, density and function of the place. Accordingly, the “Zuidas” region in Amsterdam is chosen as the new location of the case study building in the Netherlands.

The Zuidas, also known as the “financial mile”, is a developing business region in the south of the Amsterdam’s city centre [31]. Between the main rivers of Amsterdam, the Amstel and the Schinkel, Zuidas locates in the middle of residential areas of Oud-Zuid and Buitenveldert. As the prime location of Amsterdam the Zuidas consists international knowledge and business headquarters with 650.000 m² office space and around 450 companies [32]. Through the big projects in construction and transportation areas the Zuidas is developed continuously.

The energy and daylight simulations in the Netherlands are made according to the building’s new locations in Amsterdam. A new location in the Netherlands means new weather
conditions, so in the simulations Amsterdam’s weather data is used. The case study building is modeled on the same orientation with the building model in original location. In the proposed building model the building is modeled with all of its own properties and characteristics on the new location and using the new weather data the simulation is run. On the other hand, for the reference building model the building’s envelope is changed according to the ASHRAE standard. The U-values for the reference building envelope come from the values defined in the standard for the climatic zone 5 (Table 5). The lighting internal heat gain data are entered as the values in the standard (Table 6). Also shading system of the building is taken off in the reference building in the Netherlands.

Table 5: U-values of the proposed and the reference buildings.

<table>
<thead>
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Table 6: Lighting heat gains of the proposed and reference building.

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<td>Car parks</td>
<td>2</td>
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APPENDIX D: CRITICIZED GREEN BUILDING CERTIFICATION CREDITS

In the research the awarded credits of the case study building are analyzed in three aspects: local conditions, construction phase and certification phase. As the case study building is a LEED certificated building, the critical review begins with LEED credits. Besides, the credits related local conditions are compared with BREEAM-NL credits considering the evaluation of the case study building in the Netherlands.

Credits with Inappropriate Assessment Method for Local Conditions

The critical review approach is very important either for the trust against the green building certifications in the market or better and sufficient green building assessment. Credits, which
are inappropriate for local conditions become easily achieved credits because of properties, life style or regulations in that country. Mostly these credits are called “easy point” in the market, so they are kind of weak side of the certification.

**Site selection (SSc.1)**

SSc1 is about avoiding development of inappropriate sites and reducing the environmental impact from the location of a building on a site. To achieve this credit it shouldn’t be built near water sources, farmlands and such environmentally important areas [33].

The Site Selection credit is predicated on protecting virgin lands and encouraging building projects more in urban areas. However, when the subject is considered in Istanbul, then this credit loses its meaning. Because, first of all, in Istanbul there are hardly ever virgin lands. Secondly all the investors want to raise the building projects in the dense city centers and they give so much money to have any land from there. The location of the case study building is one of the most dense areas in Istanbul. This building gained one point from the Site Selection credit, as it stands on a proper urban area. However, the situation of Istanbul causes suspicion about the achievement of this credit. As the building does nothing for a green improvement, when the land protection is not an important issue for Istanbul and the investors are already interested in urban areas. Besides, the result of this credit doesn’t mean that building site selection is right for building users which can be examined as another issue in the green building assessment.

Reuse of land (LE 1) in BREEAM-NL, aim is promoting building projects to urban locations and reused lands, and minimizing use of lands with high ecological value. It can earn up to five points. Requirements: Building project should not be inside the main ecological structure (EHS) and/or similar ecological zones. The table in BREEAM-NL presents proper points depending to the building’s place [26].

The reuse of land credit of BREEAM-NL has the similar aspect with the site selection credit in LEED, but BREEAM-NL was prepared according to the Netherlands’ conditions and needs. Protecting and preserving unused lands is a significant issue in the Netherlands. Because of that, the case study building in the Netherland deserves the point from this credit. However, it can be hardly said the same for the building in Istanbul, as the characteristics of these cities and countries are very different.

**Development density & community connectivity (SSc.2)**

SSc2 encourages the development to urban areas with existing infrastructure, protect
greenfields and preserve habitat and natural resources. To meet the requirements of this credit there are two options. Option one is that building should be constructed on previously developed site and building site should be in a community with circa 5600 square meter minimum density. For second option, building site should be within circa 800 meter of a residential area or at least 10 basic services such as bank, post office, pharmacy etc [33].

The development density and community connectivity credit is about the building place and its neighbourhood. So similar to the site selection credit this does not also consider the condition in Istanbul or in Turkey. As it is mentioned for the previous credit the investors prefer to practice their building projects in the urban areas. This situation invites the amenities needed in this urban area like banks, supermarkets, cafes, etc. So in this picture the building doesn’t seem that it gains any green improvement from this credit.

Proximity to amenities (TRA 2.) in BREEAM-NL, aism is supporting building projects which are close to amenities in neighbourhood and so increasing emissions and energy use through transportation. One point can be earned. Requirements: There should be local facilities like shops, banks, groceries etc. within 500 m in order to go by walking [26].

The assessment of the credit proximity to amenities in BREEAM-NL is fairly similar to the development density and community connectivity credit in LEED. This credit encourages the building projects in urban areas and so it protects the virgin lands and also minimizes travel energy consumptions. It is very important for an assessment in the Netherlands’ conditions; however, it is not the same in such a big and dense city like Istanbul.

**Alternative transportation, bicycle storage & changing rooms (SSc4.2)**

SSc4.2 means to decrease automobile use by preferring cycling. For commercial or institutional buildings, which have circa 28.000 square meter or less floor area, it should be provided secure bicycle racks and/or storage within circa 183 meter of a building entrance for 3% or more of all building users and also shower & changing facilities in the building [33].

The alternative transportation credit in respect of bicycle usage is an important credit for reduce energy consumption in transportation; however this assessment does not consider the local conditions in Istanbul and Turkey. Transportation by bicycle is hard made in Istanbul because of the city’s size, geographical properties and insufficient bicycle substructure. Riding bicycle can be very tough and also dangerous in this city. Ignoring this situation, all what is done for this credit are only for achieving the point. In the case study building bicycle racks were provided near the first basement ramp and there are shower facilities in the second
& third basements. The building got one point of this credit; however, those bicycle racks and showers have never been used unfortunately.

Cyclist facilities (TRA 3) in BREEAM-NL, aim is increasing bicycle usage by building’s occupants through proper bicycle storage facilities. It can earn up to two points. Requirements: For one point, there should be available bicycle storage, which is covered and lockable. For two points showers, changing rooms and lockers should be supplied in addition to bicycle storages [26].

Pedestrian and cyclist safety (TRA 4) in BREEAM-NL, aim is providing pedestrian and cycling ways to access to the site safely and comfortably. It can earn up to two points. Requirements: For one point, useful and safe cycle paths are needed from the entrance to the bicycle storage in the building. Those paths should have connections with public cycle paths and should not cross highways. For the other point, pedestrian ways are also supplied like cycle paths [26].

In BREEAM-NL, the Alternative Transportation with Bicycle issue is improved a little with the credits Cyclist Facilities and Pedestrian and Cyclist Safety. These credits subject proper bicycle paths, which are connected to the main bicycle paths in the city, to a condition. For an assessment in the Netherlands, the case study building can achieve the points, but it does not happen for the situation in Istanbul, as there is not any cycling path in the city and people do not use bicycle for transportation.

**Alternative transportation, low-emitting & fuel efficient vehicles (SSc4.3)**

SSc4.3 is another alternative transportation credit which demands preferred parking close to main entrance for low-emitting and fuel-efficient vehicles for 5% of the total vehicle parking capacity of the site or installation of alternative-fuel refuelling stations for 3% of the total vehicle capacity of the site [33].

The alternative transportation credit with low emitting and fuel efficient vehicles supports preserved parking spaces for these type energy efficient cars. This credits become an “easy point” for green building assessment in Istanbul as the low emitting and fuel efficient cars are not very common for now. Hopefully in the future these cars might be widespread for energy efficiency and less greenhouse gas emission. However, for now the park spaces separated for the low emitting and fuel efficient vehicles are used like normal park spaces, although the sign about low emitting cars. In the third basement floor of building, there are parking lots for low-emitting and fuel efficient vehicles. In inside or outside the building not so many people
are aware of these separated parking places.
In BREEAM-NL there is no credit about low emitting and fuel efficient vehicles. It can be said that LEED’s consideration about this type of transportation is very important and this situation can be thought as a deficiency in BREEAM-NL, as these cars are becoming widespread day by day.

Storage & collection of recyclables (MRp.1)

The prerequisite credit of materials & resources considers about the reduction of waste generated by building occupants that is hauled to and disposed of in landfills. An easily accessible area serving the entire building should be provided and in this area should only be used for the collection and storage of non-hazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics and metals [33].

The storage and collection of recyclables credit support recyclable waste in the operational period of the building. According to the requirements of this credit a storage room should be saved for the recyclable waste. But the difficulty is in the operating period, especially in Istanbul, as in Turkey there is not a proper recycling policy and habit in comparison to the European countries. So this assessment method does not work in Turkey’s conditions so well, because in the operational period this room is not used properly. The case study building garbage rooms reserved for recyclables on the first basement. Due to the reference guide table, if construction area is between 9290 m² and 18580 m², then waste room should be at least 25.54 m². This building has around 15000 m² construction area and with 27 m² recyclable waste storage room. However, getting the limit value does not mean that collection and storage of waste is not working properly. The aim should be providing proper waste room for usage of people in the building.

Recyclable waste storage (WST 3) in BREEAM-NL, aim is encouraging storage facilities in building in order to collect operational recyclable wastes. One point can be earned. Requirement: There should be a centrally located room for collection of recyclable wastes and this room should be easily accessible, noticeable and including water supply for cleaning [26].

Regarding to storage and collection of recyclables the assessment in BREEAM-NL is made with the credit Recyclable Waste Storage similarly in LEED. But the difference is that in BREEAM-NL the usage of this space is defined better in aspect of cleaning and access. This also shows the conscious in the Netherlands about this issue. The case study building might
not achieve the point with the storage rooms for recyclables, as there is not any water supply for this room and also it’s not easy to notice that rooms.

**Environmental tobacco smoke (ETS) control (EQp.2)**

In prerequisite credits about smoking control it should be minimized exposure of building occupants, indoor surfaces, and ventilation air distribution systems to environmental tobacco smoke (ETS). First option is to prohibit smoking in the building and to locate any exterior designated smoking areas at least around 10 meter away from entries, outdoor air intakes and operable windows [33].

The ETS Control credit in LEED plays an important role for indoor air quality, as it is considered as prerequisite credit. However, it remains unimportant in any assessment in Turkey, because smoking is prohibited in all interior public spaces in there. In this situation the building projects achieve easily this prerequisite credit not doing anything.

In BREEAM-NL, the environmental tobacco smoke control issue is not considered, as there is a smoking prohibition in all public spaces in the Netherlands. This credit presents also a good example for advantages of adapted green building certification in comparison to the problem that the ETS control credit of LEED has about local conditions.

**Credits with Misapplications in the Construction Phase**

Because of the mistakes and misapplications in the construction phase of the building some credits are not succeeded as good as it is stated in the green building certifications. Sometimes this type of credits can become also easy credits, as there is not enough control in the construction and certification processes. In addition, the conscious of the contractor of the building takes an important role to achieve these credits better.

**Construction activity pollution prevention (SSp.1)**

SSp1 is a prerequisite credit for Core & Shell buildings and refers to the reducement of pollution from construction activities by controlling soil erosion, waterway sedimentation and airborne dust generation. An erosion and sedimentation control (ESC) Plan, which is about precautions to prevent loss of soil during construction by storm water runoff and/or wind erosion, to prevent sedimentation of storm sewer or receiving streams and to prevent polluting the air with dust and particulate matter, is should be prepared in order to meet the credit’s requirements [33].

The construction activity pollution prevention credit is an important credit about environment
protection and because of that it is a prerequisite credit. The credit requires various precautions and a management plan against pollution through construction activities. In the construction process of the case study building there were some precautions in respect of this credit, however, they are not well organized, so it can be called as the erosion and sedimentation control plan. The most important problem in the application of these required activities for this credit is the unconsciousness of the contractors and lack of knowledge of the workers. Because of that mostly these precautions against pollution are forgotten or not cared. After the construction there are only left some photos of these activities which are supposed to be given for LEED applications. However, as there is not any other control except that photos, most of the building projects do not have a good performance about this credit.

**Enhanced commissioning (EAc.3)**

Enhanced commissioning credits is similar to the prerequisite credit of the commissioning, only difference is that commissioning process should begin early during the design process and additional activities should be executed after systems performance verification is completed [33].

The enhanced commissioning credit in LEED plays an important role for a proper performance of the buildings. Although this big importance of the credit, there are some problems in the practice in the construction period. One reason of that the commissioning process begins mostly very late in the Turkish building sector. Although beginning from the design stage the commissioning activities should start and continue, but generally in Turkey it is made in the end of construction period. The second reason of the problems is that the quality of the commissioning activities strongly depends on conscious and attention of the contractors. If there are not enough and well organized professionals and enough time for commissioning, then the results of it won’t be sufficient enough.

**Construction waste management (MRc2.1 / 2.2)**

Construction waste management is very important issue, because in construction period there are a lot of recyclable wastes. In order to manage this big amount of waste, construction and demolition debris should be diverted from disposal in landfills and incinerators, recyclable recovered resources should be redirected back to the manufacturing process. And also reusable materials should be transferred to appropriate sites and at least 50%, 75% of non-hazardous construction and demolition debris should be recycled. Waste management calculations can be done by weight or volume, but must be consistent throughout [33].
The construction waste management credit in LEED encourages recycling, reusing and reducing construction waste. In order to achieve this credit there should be a waste management in the construction site collecting, separating and transferring this waste. During the construction phase of the case study building paper, wood, metal waste were separated and sent at for recycling. However, normally in the construction sites in Turkey a well-organized waste management is hardly applied. Unconscious contractors and careless workers prevent the process of this management. Because of that the construction waste management process should be followed and controlled carefully.

**Construction IAQ management plan, during construction (EQc.3)**

Indoor air quality management during construction period is an important issue for user comfort in the operational period. Various measures should be taken to avoid the air pollution that is generated during the construction in order to provide a qualified air for occupants. In order to meet this credit’s requirements, on-site stored or installed materials should be protected from moisture damage [33].

The construction IAQ management plan credit assesses the indoor air quality precautions during construction activities. One of the important precautions in this process is protecting air channels against dust before use and closing these air channel connections. Otherwise construction dust covers inside of the air channels and after the installation it is very hard to clean them. So, all the dust enters the rooms through the air from HVAC system. When the contractors and worker don’t pay enough attention to this precaution and there is not enough control to correct the mistakes this type of problems might occur in the building. For the achievement of the credit some photos, which show closed air channel connections and preserved air channels in the construction sites, are needed. However, if the process is not controlled enough, it is really easy to cheat.

**Credits with Misapplications in the Certification Phase**

As the last group of the critical review part, here the misapplications in the certification process are discussed. These types of credits are generally the ones that are required some special interest and information about the certifications method. Contractors and designers might not know so much about the application of these credits, so many times it works with a green building certifications consulting company. If there is not enough control about these credits, there might occur some misapplications in this process.
Optimize energy performance (EAc.1)

EAc.1 is about to achieve increasing levels of energy performance above the baseline in the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use. Project teams can document the achievement using any of the three options: whole building energy simulation (1–8 points), prescriptive compliance path (3 points possible), and prescriptive compliance path (1 point). With whole building energy simulation, building’s energy demand and performance can be determined. A percentage improvement in the proposed building performance rating should be demonstrated compared to the baseline building performance rating per ASHRAE/IESNA Standard 90.1-2004 by a whole building project simulation using the Building Performance Rating Method in Appendix G of the Standard [33].

The optimize energy performance credit in LEED is one of the most important credits in the green building assessment and also for the building performance. In this assessment the computational simulation tools can be used preferably. Building energy performance simulation of the case study was performed by a consultant firm using Design Builder program. According to the LEED reports of the case study building, the proposed building model has 1,639,533 kWh and the reference building 2,509,426 kWh energy consumption annually. Comparison between energy simulations of proposed building and reference building presents 34.7% energy optimization and 24% cost performance compared the proposed building. This means that four points were gained from eight points of this credit.

The energy modelling in the research calculates the energy demand of the proposed and the reference building depending to the case study building. As it is mentioned in the previous part about energy modelling the energy efficiency of the case study building is 5.7% considering energy demand. To be able to compare this result with the one from the building’s LEED report, the estimated energy demand of the case study building depending to the LEED report should be declared. Considering the results of the research the building is not able to gain any point from the credit. This might be a serious problem for the certification, as at least point must be gained in order to have the LEED certification.

Energy modelling through computational methods includes many variables, which can cause different results. However, in this situation the difference are very different from each other. As it can be seen from the figures below, one of the unconsidered points is shading effect of the surrounding buildings. The surrounding high buildings weren’t modelled in the one
prepared for LEED certification. Another thing is the modelling of the shading system of the building, as in this shading system there are many components like vertical metal elements and various plants. There is not any information regarding to how this system is modelled into the building energy modelling. These two important issues may affect the simulation results considerably through the amount of solar energy entering. Besides these results which are very different from each other might be a sign for the need of more control in the BPS-tools usage. The BPS-Tools and energy modelling required a proficiency in that area, so people working in design and construction phases of building are not able to follow and control them. However, incorrect results affect all the building users, tenants and building owners.

Figure 6: Reference building model prepared for LEED a) and for the research b).

**Daylight & views (EQc8.1 / 8.2)**

The aim of the daylight and view credits is to provide for the building occupants daylight and view into the regularly occupied areas of the building. LEED recommends four options to define the daylight level in the building. In the LEED certification of the case study building the daylight calculation method is used which is defined in LEED as that it should be a minimum glazing factor of 2% in a minimum of 75% of all regularly occupied areas. For the calculation of view is also similar to daylight calculation method and LEED wants the occupied areas to have 90% view. In plan view and in section view the area with the direct line of sight should be determined [33].

According to the daylight calculation, which is made by the consultant firm, the case study building has 96% daylight and 97% view. With these high results totally four points were gained; one point for daylight, one point for view and two more points as innovation. In the research the daylight availability of the case study building is calculated using BPS-Tools and
considering shading system and surrounding buildings unlikely in the method used by consulting firm. The results of the daylight modelling in the research are that the proposed building has 3.65% daylighted area and the reference building has 28.46% daylighted area. According to the results which are calculated by BPS-Tool any points can be gained from LEED. So the big difference in results means four points in the LEED certification.

The daylight availability results are very different in LEED certification of the case study building and in the research. The reason of that situation is different methods to calculate the daylight availability. The method used in LEED certification doesn’t consider surrounding buildings and the shading system which is covered all facade of the building. Besides building place on earth, sun angles and weather conditions are not able to influence the results in this calculation method. When those effects are considered in daylight calculation like in the method used in the research it can be seen that the daylight availability of the building is very few.

In the end of analysis about the case study building, significant outcomes are achieved. First of all the building performance simulation results, which are made in the research, are considerably different than the green building certification results of the case study building. This situation causes also a considerable difference about building green performance, because they are regarding to energy and daylight performance of the case study building.

On the other hand, the awarded credits from the green building certification, with which the case study building is certified, are analyzed with critics. In the analysis these aspects are considered: local characteristics in assessment, possible problems in construction phase and certification phase. According to this critical review to the building’s green performance in the certification tool it is understood that there are many credits, which do not have enough consideration about local conditions. Besides, it is pointed out that many credit points are awarded inspite of inappropriate applications in construction and certification phase. All these points, which are awarded although the problems in process, might create an incorrect results about building green performance.

APPENDIX E: Questionnaire prepared for participants in Turkey.
APPENDIX F: Questionnaire prepared for participants in the Netherlands.
APPENDIX G: Questionnaires filled out by the participants in Turkey.
APPENDIX H: Questionnaires filled out by the participants in the Netherlands.
ABSTRACT: The research of graduation project deals with a critical review about green certified buildings and green building certifications. LEED and BREEAM are the most preferred green building certifications in market all over the world. However, there are many doubts about energy efficiency and building performance assessment of these green building certifications. In this research the green building certification issue is analyzed through a case study building and it is also compared in the markets in Turkey and in the Netherlands. In addition to that, the views and comments from the market experts are considered in the scope of this project in order to find out reasons of the problems about green building certifications.
Please explain briefly your opinions about green buildings and green certified buildings:

**Green buildings**

**Green certified buildings**

Please rank the different categories of the green building certifications according to your preference:

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Other
CREDIBILITY OF THE GREEN BUILDING CERTIFICATIONS

Do you think the award of green building certifications can ensure good green building performance?

☐ Yes  ☐ No  ☐ Don't know

Do you think that the green building certifications are easily understandable and applicable?

☐ Yes  ☐ No  ☐ Don't know

In your opinion, does the green building certification method based on credits & points provide a proper assessment for buildings?

☐ Yes  ☐ No  ☐ Don't know

Do you think that the “point-chasing” mentality in green building certifications might hinder the green building design and construction performance?

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Do you think that green building certifications reduce costs in operational period of buildings?

☐ Yes  ☐ No  ☐ Don't know

Do the green building certifications affect buildings' price?

☐ Yes  ☐ No  ☐ Don't know

Do you think green buildings are economically more desirable than traditional buildings?

☐ Yes  ☐ No  ☐ Don't know

Do you think that the green building label might be misleading for building users and tenants?

☐ Yes  ☐ No  ☐ Don't know

In your opinion, do “green buildings” and “green certified buildings” refer to the same thing?

☐ Yes  ☐ No  ☐ Don't know
GREEN BUILDING CERTIFICATION PROCESS

In which building processes do you think that some problems might occur about green building certifications?

- [ ] Design
- [ ] Construction
- [ ] Usage
- [ ] Maintenance
- [ ] Documentation (for green building certifications)
- [ ] Other

In your opinion, what are the reasons of these problems?

- [ ] Lack of knowledge
- [ ] Less green-building-conscious
- [ ] Disinterest
- [ ] Difficulties about certification
- [ ] Difficulties in application
- [ ] Costs
- [ ] Lack of control
- [ ] Insufficiency in certification
- [ ] Other

GREEN BUILDING CERTIFICATIONS IN THE MARKET

Do you consider the green building certification practices in Turkey good enough?

- [ ] Yes
- [ ] No
- [ ] Don’t know

Considering the Turkish construction market, which type of green building assessment will be more beneficial for better green building performance?

Do you have any recommendations for better green building certification practices in Turkey?
THANK YOU FOR YOUR TIME AND CONSIDERATION

Özden DEMIR
ozden.demir@yahoo.com
QUESTIONNAIRE FOR THE EXPERTS FROM THE TURKISH AND DUTCH MARKET ABOUT THE GREEN BUILDING CERTIFICATIONS

Required for the Graduation Project “Building Performance and Energy Efficiency of Green Certified Buildings: Case Study in Turkey and in the Netherlands”

Özden DEMIR, M.Sc. Student
Istanbul Technical University - Eindhoven University of Technology (Exchange)

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EXPERT INFORMATION

Name
Title
E-mail
Department
Green experiences
- Green buildings
- Green building certifications (LEED, BREEAM, etc.)
- Other

COMPANY INFORMATION

* Company Name
Company Size
Industry
GREEN BUILDINGS AND GREEN CERTIFIED BUILDINGS

Please explain briefly your opinions about green buildings and green certified buildings:

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☐ Other

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☐ Difficulties in application
☐ Costs
☐ Lack of control
☐ Insufficiency in certification
☐ Other

GREEN BUILDING CERTIFICATIONS IN THE MARKET

Do you consider the green building certification practices in the Netherlands good enough?

☐ Yes   ☐ No   ☐ Don't know

Considering the Dutch construction market, which type of green building assessment will be more beneficial for better green building performance?

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Do you have any recommendations for better green building certification practices in the Netherlands?

__________________________________________
THANK YOU FOR YOUR TIME AND CONSIDERATION

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Other

[Box for Other opinion]
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Özden DEMIR
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Green Building Certifications Questionnaire

QUESTIONNAIRE FOR THE EXPERTS FROM THE TURKISH AND DUTCH MARKET ABOUT THE GREEN BUILDING CERTIFICATIONS
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GREEN BUILDINGS AND GREEN CERTIFIED BUILDINGS

Please explain briefly your opinions about green buildings and green certified buildings:

Green buildings

There are many benefits. Some of them: 
- emission reduction 
- water conservation 
- waste reduction 
- increased property values 
- decreased infrastructure strain ...

Green certified buildings

Please rank the different categories of the green building certifications according to your preference:

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Other: Healthier lifestyles and recognition.
CREDIBILITY OF THE GREEN BUILDING CERTIFICATIONS

Do you think the award of green building certifications can ensure good green building performance?

- Yes
- No
- Don't know

Do you think that the green building certifications are easily understandable and applicable?

- Yes
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In your opinion, does the green building certification method based on credits & points provide a proper assessment for buildings?

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Do you think that the "point-chasing" mentality in green building certifications might hinder the green building design and construction performance?

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Do you think that green building certifications reduce costs in operational period of buildings?

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Do the green building certifications affect buildings' price?

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Do you think green buildings are economically more desirable than traditional buildings?

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In your opinion, do "green buildings" and "green certified buildings" refer to the same thing?

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but I know that's wrong.
GREEN BUILDING CERTIFICATION PROCESS

In which building processes do you think that some problems might occur about green building certifications?

☐ Design

t Construction
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☐ Maintenance
☐ Documentation (for green building certifications)
☐ Other

In your opinion, what are the reasons of these problems?

☐ Lack of knowledge
☐ Less green-building-conscious
☐ Disinterest
☐ Difficulties about certification
☐ Difficulties in application
☑ Costs
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☐ Other

GREEN BUILDING CERTIFICATIONS IN THE MARKET

Do you consider the green building certification practices in Turkey good enough?

☐ Yes ☐ No ☐ Don't know

Considering the Turkish construction market, which type of green building assessment will be more beneficial for better green building performance?

Do you have any recommendations for better green building certification practices in Turkey?
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**EXPERT INFORMATION**

- **Name**
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- **E-mail**
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**Green experiences**

- [ ] Green buildings
- [ ] Green building certifications (LEED, BREEAM, etc.)
- [ ] Other

**COMPANY INFORMATION**

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GREEN BUILDING CERTIFICATIONS IN THE MARKET

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THANK YOU FOR YOUR TIME AND CONSIDERATION

Özden DEMIR
ozden.demir@yahoo.com
QUESTIONNAIRE FOR THE EXPERTS FROM THE TURKISH AND DUTCH MARKET ABOUT THE GREEN BUILDING CERTIFICATIONS

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☐ Green buildings
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☐ Other

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Other
CREDIBILITY OF THE GREEN BUILDING CERTIFICATIONS

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GREEN BUILDING CERTIFICATION PROCESS

In which building processes do you think that some problems might occur about green building certifications?

☐ Design
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In your opinion, what are the reasons of these problems?

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GREEN BUILDING CERTIFICATIONS IN THE MARKET

Do you consider the green building certification practices in Turkey good enough?

☐ Yes
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☐ Don’t know

Considering the Turkish construction market, which type of green building assessment will be more beneficial for better green building performance?


Do you have any recommendations for better green building certification practices in Turkey?


* Any other comments

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☐ Green buildings
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Fields with the sign (*) are not necessary to fill

EXPERT INFORMATION

Name
Title
E-mail
Department
Green experiences
  □ Green buildings
  □ Green building certifications (LEED, BREEAM, etc.)
  □ Other

COMPANY INFORMATION

* Company Name
Company Size
Industry
Please explain briefly your opinions about green buildings and green certified buildings:

Green buildings

Green certified buildings

Please rank the different categories of the green building certifications according to your preference:

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<tr>
<th>Category</th>
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Other
CREDIBILITY OF THE GREEN BUILDING CERTIFICATIONS

Do you think the award of green building certifications can ensure good green building performance?

- Yes
- No
- Don't know

Do you think that the green building certifications are easily understandable and applicable?

- Yes
- No
- Don't know

In your opinion, does the green building certification method based on credits & points provide a proper assessment for buildings?

- Yes
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Do you think that the “point-chasing” mentality in green building certifications might hinder the green building design and construction performance?

- Yes
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Do you think that green building certifications reduce costs in operational period of buildings?

- Yes
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Do the green building certifications affect buildings' price?

- Yes
- No
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Do you think green buildings are economically more desirable than traditional buildings?

- Yes
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Do you think that the green building label might be misleading for building users and tenants?

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In your opinion, do “green buildings” and “green certified buildings” refer to the same thing?

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GREEN BUILDING CERTIFICATION PROCESS

In which building processes do you think that some problems might occur about green building certifications?

☐ Design
☐ Construction
☐ Usage
☐ Maintenance
☐ Documentation (for green building certifications)
☐ Other

In your opinion, what are the reasons of these problems?

☐ Lack of knowledge
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☐ Disinterest
☐ Difficulties about certification
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☐ Lack of control
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☐ Other

GREEN BUILDING CERTIFICATIONS IN THE MARKET

Do you consider the green building certification practices in Turkey good enough?

☐ Yes ☐ No ☐ Don’t know

Considering the Turkish construction market, which type of green building assessment will be more beneficial for better green building performance?


Do you have any recommendations for better green building certification practices in Turkey?
THANK YOU FOR YOUR TIME AND CONSIDERATION

Özden DEMIR
ozden.demir@yahoo.com
QUESTIONNAIRE FOR THE EXPERTS FROM THE TURKISH AND DUTCH MARKET ABOUT THE GREEN BUILDING CERTIFICATIONS
Required for the Graduation Project “Building Performance and Energy Efficiency of Green Certified Buildings: Case Study in Turkey and in the Netherlands”
Özden DEMIR, M.Sc. Student
Istanbul Technical University - Eindhoven University of Technology (Exchange)

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Do you consider the green building certification practices in Turkey good enough?

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Other [ ]
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GREEN BUILDING CERTIFICATION PROCESS

In which building processes do you think that some problems might occur about green building certifications?

- [ ] Design
- [ ] Construction
- [ ] Usage
- [ ] Maintenance
- [ ] Documentation (for green building certifications)
- [ ] Other

In your opinion, what are the reasons of these problems?

- [ ] Lack of knowledge
- [ ] Less green-building-conscious
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GREEN BUILDING CERTIFICATIONS IN THE MARKET

Do you consider the green building certification practices in Turkey good enough?

- [ ] Yes
- [ ] No
- [ ] Don't know

Considering the Turkish construction market, which type of green building assessment will be more beneficial for better green building performance?

Do you have any recommendations for better green building certification practices in Turkey?
THANK YOU FOR YOUR TIME AND CONSIDERATION

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</tbody>
</table>

Other

[Directions for completing the table: Select the appropriate level of importance for each category. If there is an additional category not listed, please specify in 'Other' and rate it accordingly.]
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**GREEN BUILDING CERTIFICATIONS IN THE MARKET**

Do you consider the green building certification practices in Turkey good enough?

- Yes
- No
- Don't know

Considering the Turkish construction market, which type of green building assessment will be more beneficial for better green building performance?


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* Any other comments

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GREEN BUILDINGS AND GREEN CERTIFIED BUILDINGS

Please explain briefly your opinions about green buildings and green certified buildings:

**Green buildings**

Green buildings are a great achievement which are very comfortable for its users.

**Green certified buildings**

A green certification is a tool to communicate the sustainability of a building. A certification should not be a goal.

Please rank the different categories of the green building certifications according to your preference:

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GREEN BUILDING CERTIFICATIONS IN THE MARKET

Do you consider the green building certification practices in the Netherlands good enough?

- Yes
- No
- Don't know

Considering the Dutch construction market, which type of green building assessment will be more beneficial for better green building performance?

- Common green building certifications (like LEED, BREEAM)

Do you have any recommendations for better green building certification practices in the Netherlands?
THANK YOU FOR YOUR TIME AND CONSIDERATION

Özden DEMIR
ozden.demir@yahoo.com
ABSTRACT: The research of graduation project deals with a critical review about green certified buildings and green building certifications. LEED and BREEAM are the most preferred green building certifications in the market all over the world. However, there are many doubts about energy efficiency and building performance assessment of these green building certifications. In this research the green building certification issue is analyzed through a case study building and it is also compared in the markets in Turkey and in the Netherlands. In addition to that, the views and comments from the market experts are considered in the scope of this project in order to find out reasons of the problems about green building certifications.
Please explain briefly your opinions about green buildings and green certified buildings:

**Green buildings**

**Green certified buildings**

Please compare the assessment method of various categories in the green building certifications:

<table>
<thead>
<tr>
<th>Category</th>
<th>Unimportant</th>
<th>Low Importance</th>
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<td>Energy efficiency</td>
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</table>

Other: ____________________________
CREDIBILITY OF THE GREEN BUILDING CERTIFICATIONS

Do you think that the content of green building certifications is sufficient for a good green building performance?

- Yes
- No
- Don't know

Do you think that the green building certifications are easily understandable and applicable?

- Yes
- No
- Don't know

In your opinion, does the green building certification method depending on credits & points provide a proper assessment for buildings?

- Yes
- No
- Don't know

Do you think that the “point-chasing” mentality in green building certifications might hinder the green building design and construction performance?

- Yes
- No
- Don't know

Do you think that green building certifications reduce costs in operational period of buildings?

- Yes
- No
- Don't know

Do the green building certifications effect buildings' price?

- Yes
- No
- Don't know

Do you think green buildings are economically more desirable than traditional buildings?

- Yes
- No
- Don't know

Do you think that the green building label might be misleading for building users and tenants?

- Yes
- No
- Don't know

In your opinion, do “green buildings” and “green certified buildings” refer to the same thing?

- Yes
- No
- Don't know
**GREEN BUILDING CERTIFICATION PROCESS**

In which building process do you think that some problems might occur about green building certifications?

- [x] Design
- [ ] Construction
- [ ] Usage
- [ ] Maintenance
- [ ] Documentation (for green building certifications)
- [ ] Other

In your opinion, what are the reasons of these problems?

- [x] Lack of knowledge
- [ ] Less green-building-conscious
- [ ] Disinterestedness
- [ ] Difficulties about certification
- [x] Difficulties in application
- [x] Costs
- [x] Lack of control
- [ ] Insufficiency in certification
- [ ] Other

**GREEN BUILDING CERTIFICATIONS IN THE MARKET**

Do you consider the green building certification practices in the Netherlands good enough?

- [ ] Yes
- [ ] No
- [ ] Don't know

Considering the Dutch construction market, which type of green building assessment will be more beneficial for better green building performance?

- Adapted green building certification (like from LEED,

Do you have any recommendations for better green building certification practices in the Netherlands?

- [ ]
* Any other comments

THANK YOU FOR YOUR TIME AND CONSIDERATION

Özden DEMIR
ozden.demir@yahoo.com
ABSTRACT: The research of graduation project deals with a critical review about green certified buildings and green building certifications. LEED and BREEAM are the most preferred green building certifications in market all over the world. However, there are many doubts about energy efficiency and building performance assessment of these green building certifications. In this research the green building certification issue is analyzed through a case study building and it is also compared in the markets in Turkey and in the Netherlands. In addition to that, the views and comments from the market experts are considered in the scope of this project in order to find out reasons of the problems about green building certifications.
GREEN BUILDINGS AND GREEN CERTIFIED BUILDINGS

Please explain briefly your opinions about green buildings and green certified buildings:

Green buildings

Good for the environment is good for us.

Green certified buildings

Added value through recognition.

Please rank the different categories of the green building certifications according to your preference:

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<tr>
<th>Category</th>
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<td>Other</td>
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</table>

Other: health, transport, quality and future value
CREDIBILITY OF THE GREEN BUILDING CERTIFICATIONS

Do you think the award of green building certifications can ensure good green building performance?

- Yes
- No
- Don't know

Do you think that the green building certifications are easily understandable and applicable?

- Yes
- No
- Don't know

In your opinion, does the green building certification method based on credits & points provide a proper assessment for buildings?

- Yes
- No
- Don't know

Do you think that the “point-chasing” mentality in green building certifications might hinder the green building design and construction performance?

- Yes
- No
- Don't know

Do you think that green building certifications reduce costs in operational period of buildings?

- Yes
- No
- Don't know

Do the green building certifications affect buildings' price?

- Yes
- No
- Don't know

Do you think green buildings are economically more desirable than traditional buildings?

- Yes
- No
- Don't know

Do you think that the green building label might be misleading for building users and tenants?

- Yes
- No
- Don't know

In your opinion, do “green buildings” and “green certified buildings” refer to the same thing?

- Yes
- No
- Don't know
GREEN BUILDING CERTIFICATION PROCESS

In which building processes do you think that some problems might occur about green building certifications?

- [x] Design
- [x] Construction
- [ ] Usage
- [ ] Maintenance
- [x] Documentation (for green building certifications)
- [ ] Other

In your opinion, what are the reasons of these problems?

- [x] Lack of knowledge
- [ ] Less green-building-conscious
- [ ] Disinterest
- [x] Difficulties about certification
- [ ] Difficulties in application
- [x] Costs
- [ ] Lack of control
- [ ] Insufficiency in certification
- [ ] Other

GREEN BUILDING CERTIFICATIONS IN THE MARKET

Do you consider the green building certification practices in the Netherlands good enough?

- [ ] Yes
- [ ] No
- [ ] Don’t know

Considering the Dutch construction market, which type of green building assessment will be more beneficial for better green building performance?

- [ ] Adapted green building certification (like from LEED)

Do you have any recommendations for better green building certification practices in the Netherlands?

- One system, more well-known, less cost.
THANK YOU FOR YOUR TIME AND CONSIDERATION

Özden DEMIR
ozden.demir@yahoo.com
QUESTIONNAIRE FOR THE EXPERTS FROM THE TURKISH AND DUTCH MARKET ABOUT THE GREEN BUILDING CERTIFICATIONS

Required for the Graduation Project “Building Performance and Energy Efficiency of Green Certified Buildings: Case Study in Turkey and in the Netherlands”

Özden DEMIR, M.Sc. Student
Istanbul Technical University - Eindhoven University of Technology (Exchange)

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Fields with the sign (*) are not necessary to fill

EXPERT INFORMATION

Name: R. van Gerwen
Title: ing. PHSE
E-mail: RvanGerwen@Bartels.nl
Department:
Green experiences
☐ Green buildings
☒ Green building certifications (LEED, BREEAM, etc.)
☐ Other:

COMPANY INFORMATION

* Company Name: Bartels Ingenieursbureau
Company Size: ± 150 FTE
Industry: Buildings & Infrastructure
GREEN BUILDINGS AND GREEN CERTIFIED BUILDINGS

Please explain briefly your opinions about green buildings and green certified buildings:

Green buildings

Green certified buildings

Difficult to measure, to compare and to rate all the parameters involved with buildings. What is the value of the outcome?

Please rank the different categories of the green building certifications according to your preference:

<table>
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Other
CREDIBILITY OF THE GREEN BUILDING CERTIFICATIONS

Do you think the award of green building certifications can ensure good green building performance?

☐ Yes ☐ No ☐ Don't know

Do you think that the green building certifications are easily understandable and applicable?

☐ Yes ☐ No ☐ Don't know

In your opinion, does the green building certification method based on credits & points provide a proper assessment for buildings?

☐ Yes ☐ No ☐ Don't know

Do you think that the "point-chasing" mentality in green building certifications might hinder the green building design and construction performance?

☐ Yes ☐ No ☐ Don't know

Do you think that green building certifications reduce costs in operational period of buildings?

☐ Yes ☐ No ☐ Don't know

Do the green building certifications affect buildings' price?

☐ Yes ☐ No ☐ Don't know

Do you think green buildings are economically more desirable than traditional buildings?

☐ Yes ☐ No ☐ Don't know

Do you think that the green building label might be misleading for building users and tenants?

☐ Yes ☐ No ☐ Don't know

In your opinion, do "green buildings" and "green certified buildings" refer to the same thing?

☐ Yes ☐ No ☐ Don't know
**GREEN BUILDING CERTIFICATION PROCESS**

In which building processes do you think that some problems might occur about green building certifications?

- [ ] Design
- [x] Construction
- [ ] Usage
- [x] Maintenance
- [ ] Documentation (for green building certifications)
- [ ] Other

In your opinion, what are the reasons of these problems?

- [ ] Lack of knowledge
- [ ] Less green-building-conscious
- [x] Disinterest
- [ ] Difficulties about certification
- [ ] Difficulties in application
- [x] Costs
- [ ] Lack of control
- [ ] Insufficiency in certification
- [ ] Other

**GREEN BUILDING CERTIFICATIONS IN THE MARKET**

Do you consider the green building certification practices in the Netherlands good enough?

- [ ] Yes
- [ ] No
- [x] Don’t know

Considering the Dutch construction market, which type of green building assessment will be more beneficial for better green building performance?

[ ]

Do you have any recommendations for better green building certification practices in the Netherlands?

[ ]
THANK YOU FOR YOUR TIME AND CONSIDERATION

Özden DEMIR
ozden.demir@yahoo.com
ABSTRACT: The research of graduation project deals with a critical review about green certified buildings and green building certifications. LEED and BREEAM are the most preferred green building certifications in market all over the world. However, there are many doubts about energy efficiency and building performance assessment of these green building certifications. In this research the green building certification issue is analyzed through a case study building and it is also compared in the markets in Turkey and in the Netherlands. In addition to that, the views and comments from the market experts are considered in the scope of this project in order to find out reasons of the problems about green building certifications.

Fields with the sign (*) are not necessary to fill

EXPERT INFORMATION

Name | dr. J.S. (Bas) van de Griendt
Title | Manager CSR and Sustainable Develop
E-mail | b.griendt@bouwfonds.nl
Department | 
Green experiences | ☑ Green buildings
| ☑ Green building certifications (LEED, BREEAM, etc.)
| ☑ Other | GPR

COMPANY INFORMATION

* Company Name | Bouwfonds Ontwikkeling
Company Size | over 100 employees
Industry | Real Estate
Please explain briefly your opinions about green buildings and green certified buildings:

Green buildings

Many discussions on Green Buildings do not concern sustainable development but achievements on e.g. energy performance. What may be green today will lose its colour tomorrow. Therefore, should green certifications also include the GPR for housing?

Green certified buildings

Please rank the different categories of the green building certifications according to your preference:

<table>
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<tr>
<th>Category</th>
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</table>

Other Social-cultural and social-economic aspects
CREDIBILITY OF THE GREEN BUILDING CERTIFICATIONS

Do you think the award of green building certifications can ensure good green building performance?

- [ ] Yes
- [ ] No
- [ ] Don't know

Do you think that the green building certifications are easily understandable and applicable?

- [ ] Yes
- [ ] No
- [ ] Don't know

In your opinion, does the green building certification method based on credits & points provide a proper assessment for buildings?

- [ ] Yes
- [ ] No
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Do you think that the “point-chasing” mentality in green building certifications might hinder the green building design and construction performance?

- [ ] Yes
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Do you think that green building certifications reduce costs in operational period of buildings?

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Do the green building certifications affect buildings' price?

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In your opinion, do “green buildings” and “green certified buildings” refer to the same thing?

- [ ] Yes
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- [ ] Don't know
GREEN BUILDING CERTIFICATION PROCESS

In which building processes do you think that some problems might occur about green building certifications?

☐ Design  ☐ Construction  ☐ Usage  ☐ Maintenance  ☐ Documentation (for green building certifications)
☑ Other: all of the above

In your opinion, what are the reasons of these problems?

☑ Lack of knowledge  ☐ Less green-building-conscious  ☑ Disinterest  ☐ Difficulties about certification  ☐ Difficulties in application  ☐ Costs  ☐ Lack of control  ☐ Insufficiency in certification
☑ Other: too much a B2B too little a B2C approach

GREEN BUILDING CERTIFICATIONS IN THE MARKET

Do you consider the green building certification practices in the Netherlands good enough?

☐ Yes   ☐ No   ☐ Don't know

Considering the Dutch construction market, which type of green building assessment will be more beneficial for better green building performance?

Local green building certification

Do you have any recommendations for better green building certification practices in the Netherlands?

Make a distinction between utility and housing and between B2B and B2C!
A very technical approach has been taken. First, however, we should develop buildings and areas in which people want to live and/or work, not only in the short term but also in the long term. Therefore you can make technically perfect

THANK YOU FOR YOUR TIME AND CONSIDERATION

Özden DEMIR
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QUESTIONNAIRE FOR THE EXPERTS FROM THE TURKISH AND DUTCH MARKET ABOUT THE GREEN BUILDING CERTIFICATIONS

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EXPERT INFORMATION

<table>
<thead>
<tr>
<th>Name</th>
<th>Patrick Koch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td>Adviseur energie en duurzaamheid</td>
</tr>
<tr>
<td>E-mail</td>
<td><a href="mailto:pkoch@heijmans.nl">pkoch@heijmans.nl</a></td>
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<td>Department</td>
<td>Heijmans Vastgoed en Woningbouw</td>
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<td>Green experiences</td>
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<td>Green buildings</td>
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<tr>
<td></td>
<td>Green building certifications (LEED, BREEAM, etc.)</td>
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<td></td>
<td>Passive houses, zero energy houses</td>
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</table>

COMPANY INFORMATION

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<tr>
<th>* Company Name</th>
<th>Heijmans</th>
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<tr>
<td>Company Size</td>
<td>over 100 employees</td>
</tr>
<tr>
<td>Industry</td>
<td>Other</td>
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</table>
Please explain briefly your opinions about green buildings and green certified buildings:

Green buildings: There is a large gap between a pure 'green building' and the public perception of a green building. Many buildings are perceived as green building, but in fact aren't.

Green certified buildings: Green certification schemes show the green potential of a building by means of an objective and comparable score. Nevertheless, the strict framework of a certification scheme is limited to visible building elements.

Please rank the different categories of the green building certifications according to your preference:

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Other: awareness and involvement of the end-use.
CREDIBILITY OF THE GREEN BUILDING CERTIFICATIONS

Do you think the award of green building certifications can ensure good green building performance?

○ Yes  ○ No  ○ Don't know

Do you think that the green building certifications are easily understandable and applicable?

○ Yes  ○ No  ○ Don't know

In your opinion, does the green building certification method based on credits & points provide a proper assessment for buildings?

○ Yes  ○ No  ○ Don't know

Do you think that the “point-chasing” mentality in green building certifications might hinder the green building design and construction performance?

○ Yes  ○ No  ○ Don't know

Do you think that green building certifications reduce costs in operational period of buildings?

○ Yes  ○ No  ○ Don't know

Do the green building certifications affect buildings' price?

○ Yes  ○ No  ○ Don't know

Do you think green buildings are economically more desirable than traditional buildings?

○ Yes  ○ No  ○ Don't know

Do you think that the green building label might be misleading for building users and tenants?

○ Yes  ○ No  ○ Don't know

In your opinion, do “green buildings” and “green certified buildings” refer to the same thing?

○ Yes  ○ No  ○ Don't know
**GREEN BUILDING CERTIFICATION PROCESS**

In which building processes do you think that some problems might occur about green building certifications?

- [ ] Design
- [ ] Construction
- [ ] Usage
- [ ] Maintenance
- [ ] Documentation (for green building certifications)
- [x] Other: all of the above

In your opinion, what are the reasons of these problems?

- [ ] Lack of knowledge
- [ ] Less green-building-conscious
- [ ] Disinterest
- [ ] Difficulties about certification
- [ ] Difficulties in application
- [ ] Costs
- [ ] Lack of control
- [ ] Insufficiency in certification
- [x] Other: all of the above

**GREEN BUILDING CERTIFICATIONS IN THE MARKET**

Do you consider the green building certification practices in the Netherlands good enough?

- [ ] Yes
- [ ] No
- [ ] Don't know

Considering the Dutch construction market, which type of green building assessment will be more beneficial for better green building performance?

- Adapted green building certification (like from LEED,

Do you have any recommendations for better green building certification practices in the Netherlands?

- Easier adaptation of innovations within the assessments.
* Any other comments

This survey seems rather compact in relation to the addressed issues. I wonder if this will lead to accurate conclusions about the suggested problems of green building assessments.

THANK YOU FOR YOUR TIME AND CONSIDERATION

Özden DEMIR
ozden.demir@yahoo.com
**ABSTRACT:** The research of graduation project deals with a critical review about green certified buildings and green building certifications. LEED and BREEAM are the most preferred green building certifications in market all over the world. However, there are many doubts about energy efficiency and building performance assessment of these green building certifications. In this research the green building certification issue is analyzed through a case study building and it is also compared in the markets in Turkey and in the Netherlands. In addition to that, the views and comments from the market experts are considered in the scope of this project in order to find out reasons of the problems about green building certifications.
Please explain briefly your opinions about green buildings and green certified buildings:

**Green buildings**

it’s necessary because of commercial purposes and social responsibility.

**Green certified buildings**

certifications of object is inescapable for acquisitions and sells of real estate

Please rank the different categories of the green building certifications according to your preference:

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Other
Do you think the award of green building certifications can ensure good green building performance?

- Yes
- No
- Don't know

Do you think that the green building certifications are easily understandable and applicable?

- Yes
- No
- Don't know

In your opinion, does the green building certification method based on credits & points provide a proper assessment for buildings?

- Yes
- No
- Don't know

Do you think that the “point-chasing” mentality in green building certifications might hinder the green building design and construction performance?

- Yes
- No
- Don't know

Do you think that green building certifications reduce costs in operational period of buildings?

- Yes
- No
- Don't know

Do the green building certifications affect buildings' price?

- Yes
- No
- Don't know

Do you think green buildings are economically more desirable than traditional buildings?

- Yes
- No
- Don't know

Do you think that the green building label might be misleading for building users and tenants?

- Yes
- No
- Don't know

In your opinion, do “green buildings” and “green certified buildings” refer to the same thing?

- Yes
- No
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GREEN BUILDING CERTIFICATION PROCESS

In which building processes do you think that some problems might occur about green building certifications?

- Design
- Construction
- Usage
- Maintenance
- Documentation (for green building certifications)
- Other

In your opinion, what are the reasons of these problems?

- Lack of knowledge
- Less green-building-conscious
- Disinterest
- Difficulties about certification
- Difficulties in application
- Costs
- Lack of control
- Insufficiency in certification
- Other

GREEN BUILDING CERTIFICATIONS IN THE MARKET

Do you consider the green building certification practices in the Netherlands good enough?

- Yes
- No
- Don't know

Considering the Dutch construction market, which type of green building assessment will be more beneficial for better green building performance?

- Common green building certifications (like LEED, BREEAM)

Do you have any recommendations for better green building certification practices in the Netherlands?
Any other comments

THANK YOU FOR YOUR TIME AND CONSIDERATION

Özden DEMIR
ozden.demir@yahoo.com
QUESTIONNAIRE FOR THE EXPERTS FROM THE TURKISH AND DUTCH MARKET ABOUT THE GREEN BUILDING CERTIFICATIONS

Required for the Graduation Project “Building Performance and Energy Efficiency of Green Certified Buildings: Case Study in Turkey and in the Netherlands”
Özden DEMIR, M.Sc. Student
Istanbul Technical University - Eindhoven University of Technology (Exchange)

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Fields with the sign (*) are not necessary to fill

EXPERT INFORMATION

Name  Tom Bosschaert
Title  Director
E-mail  tom@except.nl
Department

Green experiences
- [x] Green buildings
- [x] Green building certifications (LEED, BREEAM, etc.)
- [x] Other  Integrated sustainable urban redevelopment

COMPANY INFORMATION

* Company Name  Exception Integrated Sustainability
Company Size  10-50 employees
Industry  Other
Please explain briefly your opinions about green buildings and green certified buildings:

### Green buildings
Very few truly 'green buildings' exist, and if they do they're always renovations. In the Netherlands it's hard to name a single example.

### Green certified buildings
 Mostly greenwashing. Pulling the bottom of the market up, not pushing the boundaries further. They obscure the real issues.

Please rank the different categories of the green building certifications according to your preference:

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CREDIBILITY OF THE GREEN BUILDING CERTIFICATIONS

Do you think the award of green building certifications can ensure good green building performance?

○ Yes   ○ No   ○ Don't know

Do you think that the green building certifications are easily understandable and applicable?

○ Yes   ○ No   ○ Don't know

In your opinion, does the green building certification method based on credits & points provide a proper assessment for buildings?

○ Yes   ○ No   ○ Don't know

Do you think that the “point-chasing” mentality in green building certifications might hinder the green building design and construction performance?

○ Yes   ○ No   ○ Don't know

Do you think that green building certifications reduce costs in operational period of buildings?

○ Yes   ○ No   ○ Don't know

Do the green building certifications affect buildings' price?

○ Yes   ○ No   ○ Don't know

Do you think green buildings are economically more desirable than traditional buildings?

○ Yes   ○ No   ○ Don't know

Do you think that the green building label might be misleading for building users and tenants?

○ Yes   ○ No   ○ Don't know

In your opinion, do “green buildings” and “green certified buildings” refer to the same thing?

○ Yes   ○ No   ○ Don't know
GREEN BUILDING CERTIFICATION PROCESS

In which building processes do you think that some problems might occur about green building certifications?

- Design
- Construction
- Usage
- Maintenance
- Documentation (for green building certifications)
- Other: Societal value, deconstruction, etc...

In your opinion, what are the reasons of these problems?

- Lack of knowledge
- Less green-building-conscious
- Disinterest
- Difficulties about certification
- Difficulties in application
- Costs
- Lack of control
- Insufficiency in certification
- Other: Insufficient understanding of sustainability

GREEN BUILDING CERTIFICATIONS IN THE MARKET

Do you consider the green building certification practices in the Netherlands good enough?

- Yes
- No
- Don't know

Considering the Dutch construction market, which type of green building assessment will be more beneficial for better green building performance?

Do you have any recommendations for better green building certification practices in the Netherlands?

Set up a true integrated sustainable evaluation system, which is not tied to buildings alone, but to the whole of society. This way the value of real estate, its functions and its conversion can be evaluated. Looking at just a building makes no sense.
THANK YOU FOR YOUR TIME AND CONSIDERATION

Özden DEMIR
ozden.demir@yahoo.com
QUESTIONNAIRE FOR THE EXPERTS FROM THE TURKISH AND DUTCH MARKET ABOUT THE GREEN BUILDING CERTIFICATIONS

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Fields with the sign (*) are not necessary to fill

EXPERT INFORMATION

Name: Schipper J.M.
Title: Ing.
E-mail: i.schipper@hurks.nl
Department: Hurks Integral Werken
Green experiences: Green buildings, Green building certifications (LEED, BREEAM, etc.), Other (GPR, DuBo (Dutch Green, Healthy Rules)

COMPANY INFORMATION

* Company Name: Hurks
Company Size: ± 300 milj. €.
Industry: Building
GREEN BUILDINGS AND GREEN CERTIFIED BUILDINGS

Please explain briefly your opinions about green buildings and green certified buildings:

Green buildings

Very good → But do we know what they are? A lot of traditional buildings are.

Green certified buildings

Too much work you can get a lot of points/credits without being green.

Please rank the different categories of the green building certifications according to your preference:

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</table>

Other: You or we shouldn’t just count the costs but also the effects & benefits for the future. I also think that green buildings are worth more to developers in the future.
CREDIBILITY OF THE GREEN BUILDING CERTIFICATIONS

Do you think the award of green building certifications can ensure good green building performance?

☐ Yes  ☒ No  ☐ Don't know

Do you think that the green building certifications are easily understandable and applicable?

☐ Yes  ☒ No  ☐ Don't know

In your opinion, does the green building certification method based on credits & points provide a proper assessment for buildings?

○ Yes  ☐ No  ☐ Don't know

Do you think that the “point-chasing” mentality in green building certifications might hinder the green building design and construction performance?

■ Yes  ☐ No  ☐ Don't know

Do you think that green building certifications reduce costs in operational period of buildings?

☐ Yes  ☐ No  ☐ Don't know

Do the green building certifications affect buildings' price?

☑ Yes  ☐ No  ☐ Don't know

Do you think green buildings are economically more desirable than traditional buildings?

☑ Yes  ☐ No  ☐ Don't know

Do you think that the green building label might be misleading for building users and tenants?

☐ Yes  ☐ No  ☐ Don't know

In your opinion, do “green buildings” and “green certified buildings” refer to the same thing?

☐ Yes  ☒ No  ☐ Don't know
GREEN BUILDING CERTIFICATION PROCESS

In which building processes do you think that some problems might occur about green building certifications?

☑ Design
☐ Construction
☐ Usage
☐ Maintenance
☐ Documentation (for green building certifications)
☐ Other

In your opinion, what are the reasons of these problems?

☐ Lack of knowledge
☐ Less green-building-conscious
☐ Disinterest
☐ Difficulties about certification
☐ Difficulties in application
☐ Costs
☐ Lack of control
☐ Insufficiency in certification
☑ Other

GREEN BUILDING CERTIFICATIONS IN THE MARKET

Do you consider the green building certification practices in the Netherlands good enough?

☐ Yes  ☐ No  ☐ Don’t know

Considering the Dutch construction market, which type of green building assessment will be more beneficial for better green building performance?

Buildings from wood and bio-based materials

Do you have any recommendations for better green building certification practices in the Netherlands?

Just give credits to good and healthy materials that is used for 50 years and energy efficiency.
THANK YOU FOR YOUR TIME AND CONSIDERATION

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GREEN BUILDINGS AND GREEN CERTIFIED BUILDINGS

Please explain briefly your opinions about green buildings and green certified buildings:

Green buildings

Green certified buildings

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Other: connectivity & transport
CREDIBILITY OF THE GREEN BUILDING CERTIFICATIONS

Do you think the award of green building certifications can ensure good green building performance?

○ Yes ○ No ○ Don't know

Do you think that the green building certifications are easily understandable and applicable?

○ Yes ○ No ○ Don't know

In your opinion, does the green building certification method based on credits & points provide a proper assessment for buildings?

○ Yes ○ No ○ Don't know

Do you think that the “point-chasing” mentality in green building certifications might hinder the green building design and construction performance?

○ Yes ○ No ○ Don't know

Do you think that green building certifications reduce costs in operational period of buildings?

○ Yes ○ No ○ Don't know

Do the green building certifications affect buildings' price?

○ Yes ○ No ○ Don't know

Do you think green buildings are economically more desirable than traditional buildings?

○ Yes ○ No ○ Don't know

Do you think that the green building label might be misleading for building users and tenants?

○ Yes ○ No ○ Don't know

In your opinion, do “green buildings” and “green certified buildings” refer to the same thing?

○ Yes ○ No ○ Don't know
GREEN BUILDING CERTIFICATION PROCESS

In which building processes do you think that some problems might occur about green building certifications?

- [ ] Design
- [ ] Construction
- [x] Usage
- [x] Maintenance
- [x] Documentation (for green building certifications)
- [ ] Other

In your opinion, what are the reasons of these problems?

- [x] Lack of knowledge
- [ ] Less green-building-conscious
- [x] Disinterest
- [ ] Difficulties about certification
- [ ] Difficulties in application
- [ ] Costs
- [ ] Lack of control
- [ ] Insufficiency in certification
- [ ] Other

GREEN BUILDING CERTIFICATIONS IN THE MARKET

Do you consider the green building certification practices in the Netherlands good enough?

- [ ] Yes
- [ ] No
- [ ] Don't know

Considering the Dutch construction market, which type of green building assessment will be more beneficial for better green building performance?

- Common green building certifications (like LEED, BREEAM)

Do you have any recommendations for better green building certification practices in the Netherlands?
Thank you for your time and consideration.

Özden DEMIR
ozden.demir@yahoo.com