

Doctoral Seminar on Sustainability Research in the Built Environment

DS²BE



Book of abstracts

3rd Doctoral Seminar on Sustainability
Research in the Built Environment

28th & 29th April 2016

Organized by KU Leuven and UHasselt

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Edited by: KU Leuven, Department of Architecture, Faculty of Engineering Science (Prof. Karen Allacker), University Hasselt, Faculty of Architecture and Arts (Prof. Griet Verbeeck, Prof. Elke Knapen)

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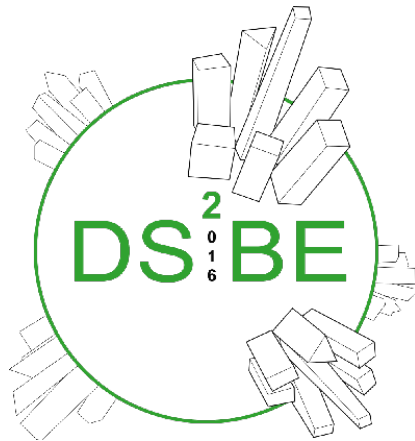


Table of content

A brief introduction	7
Committees and partners	8
Program overview	11
Abstracts	15
Public space planning & designing for small towns - <i>Darik Zebenigus Wuhib</i>	16
Integrating green infrastructure with place attributes - <i>Woldeyes Zewdu Tesfaye</i>	18
Hydrological Urban Ecosystems Analysis supported by Remote Sensing - <i>Charlotte Wirion</i>	20
Assessing the potential of circular economy through dynamic material stock accounting of the Brussels-Capital Region - <i>Yves Bettignies Cari</i>	22
Do Institutions Matter in Planning? The case of the small town of Amdework - <i>Lia G. Mariam Woldetsadik</i>	26
Assessing the hospital building sustainability: user experience in applying the qualitative tools and steps towards the life cycle approach - <i>Milena Stevanovic</i>	28
Zero Energy Lightweight Construction Households for Urban Densification - <i>Mohamed Amer</i>	30
Dynamic dwellings as innovative and sustainable renovation concept - <i>Ann Bosserez</i>	32

EE + UD = Comfort ? Merging Energy Efficiency and Universal Design in Housing Renovations - <i>Ermal Kapedani</i>	34
Mobilization for energy renovation - <i>Victoria Taranu</i>	36
Modelling of long-term deep renovation strategies for the Belgian building stock - <i>Guirec Ruellan</i>	38
From rough estimation of heating energy to dynamic simulation - <i>Ayu Miyamoto</i>	40
Geocooling in Tropical Areas: Relevance and perspectives - <i>Price Njanda</i>	42
'Co-operative Urbanism' Re-Thinking Co-operatives as Facilitators of Sustainable Urbanization in Emerging Towns of Ethiopia - <i>Bisrat K Woldeyessus</i>	44
Analysis of city-size distribution of sub-saharan Africa: Empirical evidence from 1988 to 2012 in Ethiopia - <i>Amha Ermias</i>	46

A brief introduction

The DS²BE is a joint initiative of research groups working on sustainability issues at eight Belgian universities: ULB, VUB, KU Leuven, UCL, ULg, UHasselt, UAntwerpen and UGent. It started in 2014 with three noon sessions at ULB and in 2015 it was extended to a two-day seminar at ULB.

Conceived as a platform for PhD researchers whose work engages the built environment at different scales in the framework of sustainability, these seminars provide an excellent opportunity for the doctoral students of the partner institutions to present their ongoing research. They will get feedback from a broad panel of sustainability experts, including invited specialists and peers, for furthering their research.

The DS²BE 2016 is a two-day event, organized by KULeuven and Hasselt University. The seminar takes place at “La Foresta” in Vaalbeek on Thursday the 28th and Friday the 29th of April 2016.

More information on the program and activities at the seminar can be found at the webpage:

www.uhasselt.be/UH/doctoral-school-behavioral-sciences-and-humanities/activities-for-PhD-students-in-the-DS-BSampampH/Doctoral-Seminar-on-Sustainability-Research-in-the-Built-Environment.html

Committees and partners

Scientific committee

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Vrije Universiteit Brussel

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Faculty of Science and Bio-Engineering Sciences - Cartography & GIS (Prof. Frank Canters)

Faculty of Engineering - Hydrology (Prof. Marijke Huysman)

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Universiteit Hasselt

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Université de Liège

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Faculty of Applied Sciences - SBD Lab (Prof. Shady Attia)

Gembloux Agro-Bio Tech – Biodiversité et Paysage (Prof. Jan Bogaert, Prof. Grégory Mahy)

Universiteit Gent

Faculty of Engineering and Architecture - Architecture and Urban Planning (Prof. Arnold Janssens)

Program overview

Thursday 28 April

9:30 Registration with coffee

Session 1.1

10:00 Darik Zebenigus Wuhib

Public space planning & designing for small towns

10:20 Woldeyes Zewdu Tesfaye

Integrating green infrastructure with place attributes

10:40 Charlotte Wirion

Hydrological Urban Ecosystems Analysis supported by Remote Sensing

11:00 Yves Bettignies Cari

Assessing the potential of circular economy through dynamic material stock accounting of the Brussels-Capital Region

11:20 short break

Session 1.2

11:30 Lia G. Mariam Woldetsadik

Do Institutions Matter in Planning? The case of the small town of Amdework

11:50 Milena Stevanovic

Assessing the hospital building sustainability: user experience in applying the qualitative tools and steps towards the life cycle approach

12:10 Mohamed Amer
Zero Energy Lightweight Construction Households for Urban
Densification

12:30 14:00 lunch

Session 1.3

14:00 Ann Bosserez
Dynamic dwellings as innovative and sustainable renovation
concept

14:20 Ermal Kapedani
EE + UD = Comfort ? Merging Energy Efficiency and Universal
Design in Housing Renovations

14:40 Victoria Taranu
Mobilization for energy renovation

15:00 Guirec Ruellan
Modelling of long-term deep renovation strategies for the Belgian
building stock

15:20 Ayu Miyamoto
From rough estimation of heating energy to dynamic simulation

15:40 16:00 coffee break

Session 1.4

16:00 Price Njanda
Geocooling in Tropical Areas: Relevance and perspectives

16:20 Bisrat K Woldeyessus
'Co-operative Urbanism' Re-Thinking Co-operatives as
Facilitators of Sustainable Urbanization in Emerging Towns of
Ethiopia.

16:40 Amha Ermias

Analysis of city-size distribution of sub-saharan Africa:
Empirical evidence from 1988 to 2012 in Ethiopia

17:00 Drink

18:00 SymbioVille - a serious game on environmental and
social entrepreneurship

20:00 Dinner

Friday 29 April

Session 2.1

8:30 Francois Denis

9:05 Elke Meex

9:40 Lien Wijnants

10:15 coffee break

Session 2.2

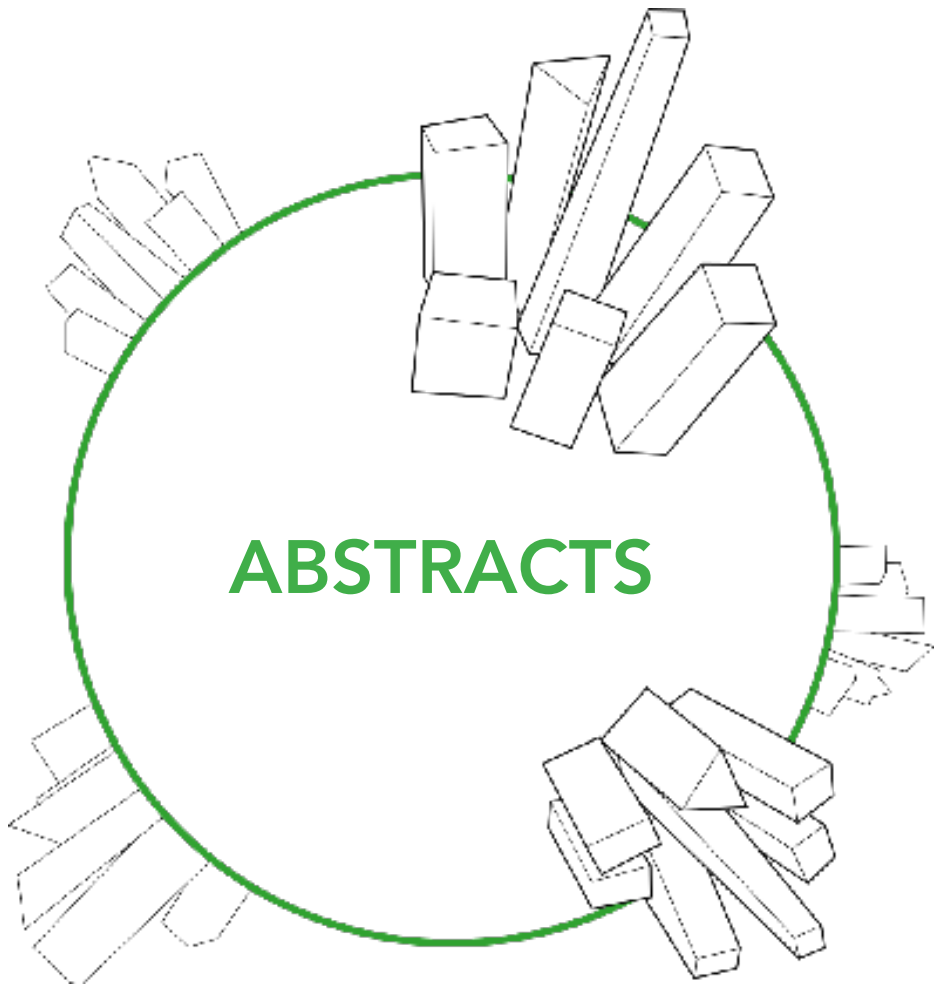
10:40 Tomas Crols

11:15 Philip Stessens

11:50 Nadia Mirabella

12:10 Teshome Tefera Tola

12:30 lunch



Public space planning & designing for small towns

Darik Zebenigus Wuhib

Supervisor: Prof. Ahmed Khan and Dr. Fisseha Wogayehu

Co-supervisor: Prof. Philippe Bouillard

Faculty of Polytechnic, BATir, Université Libre de Bruxelles
Addis Ababa University, EiABC

Public spaces are considered the key areas where most human beings' daily activities take place. They are the platforms for our necessary and optional activities. And in an era where the public private divide is blurring and more varied public spaces and platforms are being created, addressing and shaping issues in this realms will determine how the city's intricate system functions and how its inhabitants live. This point has been stressed and emphasized by the writings of various urban planners and designers including Jacobs, Lynch, Lefebvre, Banerjee, Sternberg, Montgomery, Carmona, Gehl, , Mandanipour & many others.

However, understanding public spaces in the regional and local context of the study area, i.e. Ethiopia and Amdework, and their integration in planning and design process is an aspect not adequately addressed. Therefore, this research will first understand, identify and categorize successful working public spaces along with their current planning process learning from global theories and looking to local context of Ethiopia. It will be giving special attention for developing a methodology suitable for integrating these spaces in the planning and design of small towns.

Specifically, successful working public spaces' and public realm's contextual definition will be drawn up; including spatial, non spatial as well as functional delineation and characteristics. Their role in the city's development and which values contribute towards that will be identified. And a tool/methodology will be developed on how to integrate these values physically, socially and economically for the sustainable growth of the urban.

The claim is that the planning and designing of small cities should center on the contextualized public realm and public spaces for sustainable growth.

In conclusion, this research will closely examine working public spaces in a developing nation and highlight on a methodology for integrating them in planning and design for a sustainable development of towns.

Notes

Integrating green infrastructure with place attributes

Woldeyes Zewdu Tesfaye

Supervisor: Prof. Gregory Mahy and Dr. Fisseha Wogayehu

Co-supervisor: Prof. Philippe Bouillard

University of Liege, Gembloux Agro Biotech

Addis Ababa University, EiABC

The purpose of this research is to investigate the possibilities of place based urban development from an ecological perspective by focusing on Integrating green infrastructure with place attributes in emerging cities of Ethiopia. This research specifically examines the characteristics of urban green areas along the urban rural gradient in emerging cities of Ethiopia, the provision of multifunctional ecosystem services by the existing green areas , the place value of the city and the integration of urban green infrastructure with place attributes.

To characterize typologies of urban green areas this research uses spatial analysis on mainly employing urban structural analysis (Niemila, 2011). The provision of multifunctional ecosystem services can be studied based on the maps of typologies of urban green infrastructure to quantify the selected multifunctional services of urban green areas. Expert evaluation, observation and survey methods in general and specially to understand the place attribute associated with type and level of place attachment Williams and Vaske's (2003) place attachment instrument will be used.

Specially to understand the place attribute associated with physical setting and activities, place quality measurements called Metrics for Livable places (Ewing, Reid et al,2013) , space syntax, and place maker will be used. To understand the trade offs and synergies that might arise in the integration of green infrastructure and place attributes this research uses the spatial overlay and synergies - tradeoffs analysis.

Notes

Hydrological Urban Ecosystems Analysis supported by Remote Sensing

Charlotte Wirion

Supervisor: Prof. Willy Bauwens and Prof. Boud Verbeiren

Department of Hydrology and hydraulic engineering,
Vrije Universiteit Brussel (VUB)

To organize urban planning in order to maintain the current living standard in cities with a high urbanization rate; it is important to quantify urban ecosystem services. Unfortunately, current policy support tools, such as environmental models, are not well adapted to the high level of heterogeneity of urban landscapes and would greatly benefit from detailed, multi-temporal, and spatially distributed input data. The potential of remote sensing data to describe the heterogeneous urban landscape is explored within the frame work of this PhD and the linked UrbanEARS project (BELSPO STEREO III programme).

In this PhD research, I use high-resolution airborne remote sensing data (APEX, LiDAR), medium resolution satellite data (Landsat, ProbaV and (simulated) Sentinel2) and a variety of ancillary data sources (e.g. digital elevation models, 3D city model, slope maps) to characterize the urban land cover. Starting from a hierarchical scheme of functional land cover classes and properties, the potential of optical imagery for generic hydrological model parameterization is evaluated. Hydrological parameter maps are derived from remote sensing data and validated by ground-truth data, collected during extensive field campaigns. The hydrological response of an urban micro-catchment is quantified and validated

through a number of hydrological experiments. Further, the transferability of the approaches developed on high-resolution hyperspectral imagery to imagery of lower spatial and spectral resolution is analyzed by upscaling the hydrologic response from field scale (2 m resolution) to a city wide scale (30 m resolution) using a spatial metric approach.

The main objective is to develop a quantitative ecosystem service simulation tool on urban water regulation making optimal use of the detailed, high-resolution remote sensing based characterization of the urban ecosystem. The detailed and spatially distributed quantitative estimate of the potential and actual storage and retention capacity of the urban ecosystem will allow urban planners and policy makers to make optimal use of ecosystem services on urban water regulation.

Notes

Assessing the potential of circular economy through dynamic material stock accounting of the Brussels-Capital Region

Yves Bettignies Cari

Supervisor: Prof. Rika Devos

Ecole Polytechnique de Bruxelles, Building Architecture
and Townplanning, Université Libre de Bruxelles

The linear metabolic process of resource consumption and waste emission is responsible for very high environmental impacts (Kennedy, 2011). Indeed, urban areas account for 71-76% of the total CO₂ global energy-related emissions and 67-76% of the global energy use (Seto K.C., 2014). This continuously ongoing process can be addressed by the complexity of the system we have created as a city which is a major obstacle for proper resource efficiency and even management.

At the same time some strategies of resource management are proposed, the Circular Economy being one of them. This strategy aims to reduce both resource demand and waste emission of the cities through the reuse of materials (EU Commission, 2014). In order to improve the environmental impact of cities, urban metabolisms studies have been carried out (Kennedy, 2011), providing data of the resulting flows of materials and energy – e.g. for Brussels (Athanassiadis, 2013) (Duvigneaud, 1974). They help to assess the global impact of cities but give little information about the constitution of their metabolism, which would need a bottom-up model. In fact, we have very few information on the city as a resource system.

The research presented here tackles this issue by providing the information of its material stock as well as assessing its potential on re-circulation. By doing so, this research would define a complementary definition of the metabolism of the city, through a bottom up approach.

The research is structured in 3 phases ranging from: (1) the spatial-temporal material stock definition; (2) a prediction model of resource demand and waste emissions along with a prospection for the lock-in of the material re-circulation; (3) a set of scenarios to integrate recirculation of materials into the built environment. By doing so, the research aims to define an optimum for the Circular Economy Agenda for the city.

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Notes

Do Institutions Matter in Planning? the case of the small town of Amdework

Lia G. Mariam Woldetsadik

Supervisor: Prof. Luisa Moretto

Faculty of Architecture (La Cambre-Horta),
Université Libre de Bruxelles

This research aims to contribute to contemporary theories on the institutional approach to planning. Critiques of the communicative rational planning question its viability mainly for two reasons. On the one hand because it begins by assuming that the right planning process always leads to the 'right' outcome; and on the other hand, if the much desired consensus it aspires to attain is at all possible or even desirable. It does not consider the possibility that there may be other dynamics at play other than communication or language. As a public policy, planning needs to be studied within the broader institutional contexts in which values and relations are framed. An institutional approach to understanding urban region dynamics and public policy tries to look at planning from the perspective of 'socially constructed and embedded concepts and rationalities' (Healey, 2003). Understanding the implication of institutions and power relations under a different context in which planning occurs shades some light on the viability of these assumptions.

The research hypothesizes that institutions matter in planning; and depending on specific contexts, some institutions have more influence on actors than others. The research presents the analysis of the institutional environment in which planning is practiced in the Ethiopian small town of Amdework.

Focusing on the emerging challenges in implementation with regards to three aspects of the town's spatial plan (i.e. urban expansion, alignment of a major road and change in land use), the research traces the link between institutional dynamics and planning through qualitative research methodology and in-depth interviews. It investigates the institutional context (i.e. formal and informal rules and structures, and power relations) that underpin urban planning activities in the town to determine how existing institutional environment penetrates and influences the responses of major actors in planning. On the other hand, it establishes if planning has any effect on institutions and power relations.

Notes

Assessing the hospital building sustainability: user experience in applying the qualitative tools and steps towards the life cycle approach

Milena Stevanovic

Supervisor: Prof. Karen Allacker

Co-supervisor: Prof. Stéphane Vermeulen

Faculty of Engineering Science,
Department of Architecture, KU Leuven

With the rising worldwide sustainability trends, the healthcare industry is encouraged for philosophical, societal and economic reasons to implement the “greening movement” in its practice. Consequently, this move has resulted in the development of several sustainability certification tools focusing on healthcare settings. Among the best known ones are BREEAM, LEED and Green Guide for Healthcare. Their ease of use, holistic approach and possibility of implementation from the early-design phase, have made them very attractive among different building practitioners. However, their subjectivity in the assessment approach, leaves a doubt whether the use of these schemes leads to truly sustainable buildings. This has led to an increased awareness among architects and urban planners that the qualitative tools to assess the sustainability of their projects are not sufficient. The same questions on the sustainability of hospitals have emerged in the Flemish healthcare sector as well. On-going development of the Duurzaamheidsmeter Zorg, a qualitative tool by the Flemish Infrastructure Fund for Person-related Matters (VIPA) based on BREEAM, aims at helping building practitioners in assessing the sustainability of their hospital projects. However, urban planners and architects who had the opportunity of using it, reported some disadvantages and shortcomings.

A need is hence identified to develop a more reliable sustainability assessment method based on a quantitative approach.

As important design decisions taken during the early design phase have a high impact on the life cycle environmental burdens and financial cost of the building, a life cycle assessment (LCA) and life cycle costing (LCC) approach seem to be most appropriate. The challenge is to develop such method to be useful during the early design phase. In order to move towards the aforementioned method, it is important to compare the existing qualitative tools in terms of their weighting criteria as well as their benefits and shortcomings. This paper elaborates the first step in the research analyzing the building professionals' experiences in using sustainability assessment tools, available in Flanders, on hospital facilities during the early design phase. Their feedback is translated into a SWOT analysis which will serve as future indicators in the identification of the professional's expectation from the tools. The results from the architects' feedback and the SWOT analysis identify the professionals' expectations of an assessment method which are seen as valuable directions to consider when developing an evaluation method from a life cycle thinking perspective.

Notes

Zero Energy Lightweight Construction Households for Urban Densification

Mohamed Amer

Supervisor: Prof. Shady Attia

Faculty of Applied Sciences, SBD Lab,
Université de Liège

Belgium, like many European Countries, has a serious challenge in the housing sector. The Federal planning bureau estimates the increase of the population by one million inhabitants by 2030, which represent 600,000 additional family requiring accesses to new housing facilities. There is a significant housing shortage for individual, single parent families, seniors and students. Population ageing (mainly due to increase life expectancy) combined with a constant grow rate of individuals living in collective households, leads to a substantial increase of demand of collective households. This highlights a substantial challenge underlined mainly in the need to live in cities, which as consequence will increase the demand for smaller housing with or without integrated services or equipment in common. Furthermore, the stringent European performance environmental regulations for the building sector require that by 2020, all new construction are zero or nearly zero energy, (equivalent to 15 kWh/m²/year), with 60% efficient on-site coverage by renewable energy. The shortage of vacant land and the increasing energy performance requirements is pushing the idea of urban densification and zero energy construction households.

Timber frame constructions are the construction method of the future. In Scandinavia, Central Europe and North America, timber

frame constructions have long been tried and tested as a light weight construction technique with low embodied energy. During the recent 6 years, there has been a trend to use timber frame construction as a sustainable solution facing the economic and environmental crisis in Belgium. However, there is a lack of knowledge on the design, construction and operation of zero energy lightweight constructions for urban densification. The goal of this research is to increase urban density, expand cost-effective housing opportunities and provide leadership to accelerate the transformation towards a low carbon community. The focus aim is to demonstrate validated design prototypes and products of different zero energy, timber frame construction systems and composite components. Thus inform and support the decision making if policy makers, municipalities, developers, and architects and building engineers in Belgium.

Notes

Dynamic dwellings as innovative and sustainable renovation concept

Ann Bosserez

Supervisor: Prof. Griet Verbeeck

Co-supervisor: Prof. Jasmien Herssens

Faculty of Architecture and Arts, Sustainability Group
Hasselt University

Global problems such as depletion of natural resources and local challenges such as affordability of homes have enforced our society to commute to a more sustainable development. This has led to the Flemish energy legislation “EPB” which called for a more energy efficient upgrade of our Flemish housing stock. However, the high focus on energy-efficiency induced new problems such as increased material use by wrapping up the building envelope with large quantities of additional materials and techniques which also led to higher building costs. Moreover, typically the whole building is considered as a climatized volume throughout the year, regardless of seasonal changes because user behavior and living patterns are seldomly taken under consideration by designers.

Therefore, the aim of this research is the development of an innovative, sustainable dwelling concept that offers a dynamic internal environment in line with more diversified living and heating patterns. By making use of dynamic internal climate zones the energy consumption can be lowered without having to excessively insulate or increase material use and/or building costs while still providing optimal comfort and spatial quality.

This research will consist of three main phases. First, by means of case studies, relevant data on sustainable, climate-responsive, dynamic design strategies, user behavior/experiences and living patterns of residents is gathered. Second, a dynamic dwelling concept will be developed by doing research by design and constant qualitative and quantitative evaluation through assessment methods. Finally, the concept will be implemented in the context of shrinkage by which the surplus of traditional, static and underused dwellings, limited financial resources and a need for sustainability are questioned. The relevance of this research is to provide new dwelling concepts that allow a sustainable renovation of the traditional Flemish dwelling with minimal interventions in the living environment of the resident.

Notes

EE+UD = Comfort? Merging Energy Efficiency and Universal Design in Housing Renovations

Ermal Kapedani

Supervisor: Prof. Griet Verbeeck

Co-supervisor: Prof. Jasmien Herssens

Faculty of Architecture and Arts, Sustainability Group
Hasselt University

Demographic shifts and lifestyle changes have created demand for housing renovations to accommodate lifelong living, while environmental concerns and policy goals on energy efficiency require deep energy renovations. Despite much research on both Universal Design (UD) and energy efficiency (EE), each domain is considered separately and with only limited integrated adoption in practice. This lack of integrated understanding is a missed opportunity to create synergies that may lead to important savings in money and time and to more attractive renovation concepts. The objective of this research is to increase the integrated adoption of UD and EE measures in housing renovations by investigating the possible synergies of a joint execution of UD and EE measures during renovation.

Our hypothesis is that Comfort can be a unifying concept for UD and EE. In an attempt to verify the hypothesis the following research question is asked: Can the concept of comfort can be used to synergetically merge UD and EE measures in order to increase adoption of both in housing renovations? The methods used to begin answering the question were a literature review, a survey and a workshop session.

Since there is no literature that discusses EE and UD in tandem, they were individually considered within the scope of housing renovations with a focus on adoption. Results from EE studies identified comfort as a key non-energy motivator. Literature on the concept of comfort, within EE and as well as other fields, was further consulted to investigate its compatibility with UD and as a unifying concept. The survey among visitors at Universal Design Living Lab in Hasselt, Belgium (n=62), suggests that if the concept of comfort is expanded beyond its meaning in EE to include usability and flexibility it becomes the largest motivator for UD renovations. It also suggests that a renovation which includes both UD and EE measures is more appealing than a renovation for only UD or EE. The workshop at Include2015 conference revealed that for the participants the concept of “comfort” at home was repeatedly associated with some of the same aspects that are the focus of UD and EE renovations such as “indoor climate”, “accessibility”, “usability”, “lighting”, “flexibility” etc..

Notes

Mobilization for energy renovation

Victoria Taranu

Supervisor: Prof. Griet Verbeeck

Faculty of Architecture and Arts, Sustainability Group
Hasselt University

The commonly used policies to encourage the uptake of energy efficient measures in renovations are mostly based on monetary incentives and information provision. Both these approaches have the underlying assumption that dwellers act exclusively as rational homo economicus, who has unlimited intellectual capabilities to calculate long term ROI. However, recent findings show evidence that people have bounded rationality and bounded willpower.

A survey was undertaken with the scope of exploring this dual thinking: rational and heuristic. The heuristic aspects are based on social norms, biases such as familiarity bias, endowment effect, affect heuristic and discounting the future. The survey consists of a questionnaire and a choice experiment. The preliminary phase (n=303) shows that householders are mostly rational in their positive attitudes, while they are more balanced in the negative ones.

The second part of the survey, the choice experiment, aimed to evaluate the impact of 6 monetary and non-monetary characteristics on choosing between 4 alternative renovation measures: energy efficient windows; roof and wall insulation; heat pumps and PV panels.

Preliminary results suggest that cost, CO2 emissions, comfort and expert advice have an impact on all the measures, while visual changes and friend advice are measure dependent. The latter affect only insulation and heat pumps. The impact on the aesthetics affects wall insulation, but it is not the case for geothermal heat pumps. It might be explained by lack of knowledge that is coherent with the feedback from an open ended question. Another finding is that dwellers overestimate the impact of the monetary motivations and underestimate the impact of environmental motivations of their own decisions.

The survey shows the necessity to analyse the efficiency of the policy instruments in a wider framework, that takes into account both rational and heuristic aspects of decision making.

Notes

Modelling of long-term deep renovation strategies for the Belgian building stock

Guirec Ruellan

Supervisor: Prof. Shady Attia

Faculty of Applied Sciences, SBD Lab,
Université de Liège

To achieve the EU energy targets for 2050, the construction sector has to perform major transformations. In Belgium, the majority of building stock is particularly old and energy inefficient. The high performance of new constructions represented in the nearly zero energy buildings target is not sufficient to ensure the efficiency of the overall building sector. Therefore, it is crucial to put in place a progressive renovation policy. Despite the different renovation strategies and projects that took place in the recent year in Belgium, the overall renovation rate remains almost stable for the last ten years.

This study focuses on the renovation market in Belgium and analyzes the factors that influence the evolution of the renovation rate. The objective is the identification and development of effective strategies bypass that leads to increased renovation rates in Belgium.

The research methodology is based on an iterative process, based on a systematic literature review of Flemish and Walloon projects, publications and policy. These first work package will allow to identify factors influencing the renovation rate and in other hand to build a model of the existing building stock.

Impacts of the influencing factors on the building stock are simulated in the fourth work package in order to propose an action plan in the last part.

Three main outcomes are expected: A model of the existing building stock in Belgium and its retrofit potential, a simulation of the effects of different strategies used to increase the renovation rate in Belgium and a theoretical action plan on strategies to increase the rate of renovation in Belgium. These results are necessary to inform and support the decision making of policy makers, municipalities and operational planning authorities across Belgium.

Notes

From rough estimation of heating energy to dynamic simulation

Ayu Miyamoto

Supervisor: Prof. Frank De Troyer

Co-supervisor: Prof. Karen Allacker

Faculty of Engineering Science, Department of Architecture,
KU Leuven

Concerning Nearly Zero Energy Buildings (NZEBs), providing a design support tool for architects will be increasingly required to consider energy efficiency in each step of the process. In addition, design decisions in the early design phase are mostly in architects' hands, which limit the possibility to interact with engineers. Hence this research proposes a simple design support tool to estimate the energy consumption in the sketch design stage which can, in a later design stage, be linked to a dynamic simulation tool. The "dynamic Equivalent Heating Degree Day (dynamic EHDD)" method is elaborated and used for fast and relatively accurate energy estimations, based on a limited number of input data. In cold and moderate climates, solar energy utilization is a critical issue. Therefore the impact of the built environment on the availability of solar gains is considered from the early design phase. Solar gains are calculated based on the method defined in the Flemish Energy Performance of Buildings (EPB) regulation. Relevant sketch design parameters identified are thermal compactness, insulation level, user behaviours including temperature set-point, human activity, use of appliances and ventilation strategy and effective use of direct and indirect solar gains.

This research describes the structure of the design tool which allows the step by step development of decisions in the design process and link to dynamic energy simulation “EnergyPlus” in a later design stage in order to develop in-depth simulation and comfort analysis. The tool is developed for the Belgian context, but the approach is also valid for other contexts.

Notes

Geocooling in tropical areas : Relevance and perspectives

Price Nandja

Supervisor: **Victor Brunfaut and Youcef Bouzidi**

Université Libre de Bruxelles

In tropical regions, climate change is reflected by an increased desertification thus enhancing the cost of traditional air conditioning. When normally used, air conditioning represents today more than 80% of the energy budget of household in tropical areas. A solution based on geocooling could help reduce energy bills while improving ventilation.

Our case study is based on Kribi, a seaside town in Cameroon.

Geocooling in tropical climates could prove challenging for the following reasons inter alia:

- Low daily and annual temperature range (mainly in equatorial areas).
- Low air and underground temperature variation (as a result of the above mentioned challenge).
- Harmful condensation phenomena.
- Presence of radon and sanitary risks linked.

This research activity is part of the third goal of a more general approach that aims at investigating vernacular African architecture in theoretical, normative and operational perspectives.

This specific study on geocooling systems will help in defining energy systems for a sample house in one of the targeted countries.

The idea is to combine through this study, our knowledge of the background with the current uses and technologies so as to:

- Reduce the energy bill thanks to a better ventilation of buildings.
- Improve thermal comfort in tropical areas through an ecological system.
- Offer environmentally friendly renewable energy solutions, while promoting best practices.

Notes

'Co-operative Urbanism' Re-Thinking Co-operatives as Facilitators of Sustainable Urbanization in Emerging Towns of Ethiopia

Bisrat K Woldeyessus

Supervisor: Prof. Luisa Moretto and Dr. Heyaw Terefe

Faculty of Architecture (La Cambre-Horta), Université Libre de Bruxelles
Addis Ababa University, EiABC

Sustainable development challenges will remain concentrated in cities, particularly in the lower and middle-income countries where the pace of urbanization is fastest (UN, 2014). Rapid and Unplanned urbanization in these contexts often leads to social instability environmental degradation. In addition, Existing socio-economic networks of the rural communities are also disrupted leading to marginalization while joining the competitive and market oriented urban system. Although some researches tried to address these dimensions of urbanization, little is known about how rural communities could integrate with in emerging small towns. With 18% of urbanization level and about 4.5% rate of urbanization, the need for sustainable urbanization is high in Ethiopia.

Compared to other forms of organizations, cooperatives have played better roles in rural marketing and agricultural businesses. Understanding the significance of co-operatives, the UN declared 2012 the International Year of Cooperatives to call attention to their “invaluable contribution to poverty reduction, employment generation and social integration” and the “strengths of the cooperative business model as an alternative means of doing business and furthering socioeconomic development”.

However, their potential contribution to the urbanization of small towns is often undermined and hardly researched. Taking the case of Amdework, a Small Emerging Town in Ethiopia, this paper tries to explore the extent to which cooperatives could foster sustainable urbanization in order to understand its effect on urban development, resource management and decision making process. Randomly Selected Housing cooperatives and Consumers' Cooperatives in Amdework are used as cases to measure their contribution in urban development. Using literature reviews, in depth interviews, focused group discussion and community workshop; the research analyzes and concludes on potential of cooperatives in framing sustainable urbanization.

Notes

Analysis of city-size distribution in Susbsaharan Africa: Empirical evidence from 1988 - 2012

Ermias Ahma

Supervisor: Jan Bogaert and Fisseha Wogayehu

Joint Academic and Research Program of Ethiopian Institute of Architecture,
Building Construction and City Development
Université de Liège, Gembloux Agro-Bio Tech

This research uses urban data to investigate the evolution of Ethiopia's city-size distribution from 1988-2015. The research attempts to answer the question: 'What does the evolutionary trend of Ethiopian city size distribution look like from 1988 – 2015, by using different analytical approaches? Hence, the objective is to investigate city size distribution changes in the recent Ethiopian urban system. Since large cities are expected to have economic opportunities compared to small and medium sized ones, we hypothesized that large cities have grown faster than small and medium sized cities to be the main source of urban growth. This leads us to understand which urban model - parallel, divergent or convergent ' the country urban system looks like

In Ethiopia cities are defined as "urban centers" with established municipality or having a population size of 2,000 or above inhabitants, of which 50% of its labor force is primarily engaged in non-agricultural activities(Federal Negarit Gazeta 2008). As there is no specific "threshold number" in defining a city in Ethiopia, some "urban centers" with inhabitants of less than 200 could also be considered as cities.

To set threshold number and make convenient for analysis, we used three levels of cities:

- Cities as urban agglomeration with a total urban population of 50,000 and above (Schmidt and Kedir 2009);
- Cities with population between 20,000 to 50,000 and
- Cities with population between 2,000 and 20,000 (Ethiopian Development Research Institute (EDRI) and the Global Green Growth (GGGI) 2015).

Quantitative method was used where analysis was done using descriptive statistics, time-series Gini coefficients, panel unit root test and Pareto exponent estimates. It is found that the overall city size distribution in Ethiopia follows parallel growth model from 1988 to 2015, where there exists little divergence from 1988 to 1994 and some convergence from 1994 to 2007. This shows that the parallel growth rule of city-size distribution also applies to Sub-Saharan African countries, though it might work differently there. Strikingly, however, this growth is unpredictable in the future as the country's urbanization is less mature and incomplete. The study also shows that a large number of Ethiopian cities (more than 86 percent) are concentrated towards the lower end of the urban hierarchy, between 2,000 - 20,000 inhabitants, which accounted for about 36-38 per cent of the total city population. This demonstrates increasing demand for huge encroachment of adjacent agricultural and forestlands having ecological implications.

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