RESTORE

REthinking Sustainability TOwards a Regenerative Economy

# Sustainability, Restorative to Regenerative

An exploration in progressing a paradigm shift in built environment thinking, from sustainability to restorative sustainability and on to regenerative sustainability.

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**RESTORE Working Group One Report: Restorative Sustainability**


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# 01 INTRODUCTION

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# SUSTAINABILITY: FROM RESTORATIVE TO REGENERATIVE

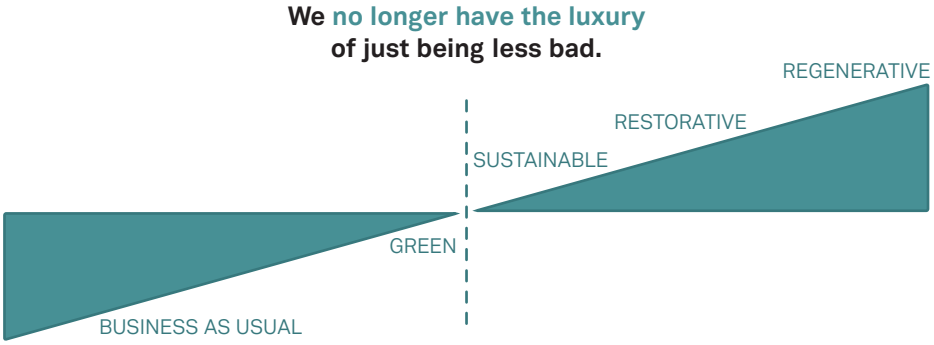
It is now some 30 years since Brundtland defined sustainable development, broadly defined as not doing anything today to compromise tomorrow's generation, and in doing so defined sustainability for business and enterprises globally.

Many in the built environment have taken this passive 'do nothing' approach, as license to do the least possible. Consequently, we have and we continue to compromise future generations.

The built environment is a huge influencer on 'sustainability', we spend over 90% of our time working, living and playing within our buildings. Despite sustainability and corporate social responsibility initiatives it is irresponsible that we have generally failed to grasp our influence and to address the potential to move the needle on wider global sustainability and climate issues.

Buildings, and the manner in which we design, construct and maintain them have been a significant contributor to climate breakdown we are witnessing. Restorative and regenerative approaches can flip this enabling buildings to become part of climate regeneration solutions.

Maybe sustainability is not a journey, but a state of equilibrium, based on giving as much as we take. On the negative side where we take more, we are unsustainable and no matter how much we reduce our impacts we will always remain unsustainable. On the positive side 'to do more good' we open doors to restore environments and communities, and to create and enable conditions for environmental, social and economic regenerative growth.



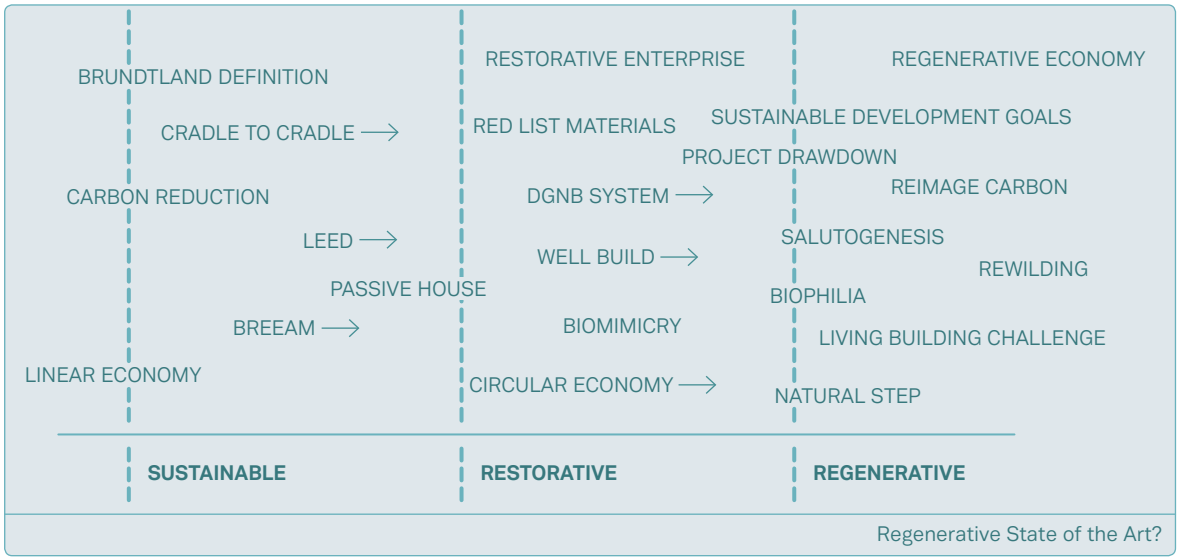

Core to RESTORE are the definitions of sustainability, restorative and regenerative.

**SUSTAINABILITY:**
**Limiting impact.** The balance point where we give back as much as we take

**RESTORATIVE:**
Restoring social and ecological systems **to a healthy state**

**REGENERATIVE:**
Enabling social and ecological systems to maintain a healthy state **and to evolve**

Within the built environment we have strategies, approaches and tools that seek a state of sustainability, that is in limiting impact; we have strategies, approaches and tools that seek to go one step further, and to restore our social and eco systems to a healthy state; and we have emerging strategies, approaches and tools that will allow healthy systems to flourish and evolve.




Alongside this sustainability equilibrium, the language of sustainability is evolving, from one that has been too combative, technical and confrontational to one that is mindful, embracing a language of collaboration and sharing with more diverse, open and inclusive approaches.

Even during the short time of this action and working group we have witnessed the language of sustainability shift. Only a few months ago terms such as doing more good, net positive and restorative sustainability were on the fringe of built environment sustainability thinking. Today they are more mainstream within the business sustainability agendas.

As the UKGBC Value of Sustainability (UKGBC 2018) report noted:

> *Much has been written on how businesses are moving towards doing more good rather than less bad. The phrases 'net positive' and 'restorative enterprise' are now appearing within sustainable business circles, with both referring to businesses that put back more than they take and restore social and natural capital whilst making a profit. Such businesses may be termed as using a 'business with impact' approach or being a 'purpose driven' organisation. In this context, 'purpose' may be defined 'an aspirational reason for being which inspires and provides a call to action for an organisation, its partners and stakeholders, and provides benefit to local and global society'.*

Our built environment world is speeding up. We are seeing robotic construction, augmented reality, driverless cars and artificial intelligence increasingly common place. We have new innovative, often nature based, materials invented that promise better performance for health, energy and the planet. Old materials are being reinvented and repurposed within the circular economy thinking principles. Climate change or climate disruption is the backdrop to change in the built environment, demanding resilience and change.

We need healthy buildings, we need socially, culturally rich, economically viable and ecological sound net-positive buildings. The important question is no longer why or if, but how and how.

This then is the future, challenging us to change or be changed. As Stuart Brand famously commented, if we are not part of the steam roller, we will become part of the road.

# RESTORE CONTEXT

The work of Working Group One has been undertaken within the context of a shifting paradigm over the last 12 – 24 months within the design, construction, operation and maintenance of buildings across the EU and worldwide. We are seeing a new normal emerge.

**PARIS:**
Limiting temperature increases to 1.5 DegC will re-set built environment sustainability codes, strategies and targets.

**HEALTH AND WELLBEING:**
Sustainability is now longer only considered with resources and energy, but significantly human-centric.

**SUSTAINABLE DEVELOPMENT GOALS:**
The United Nations SDG's are igniting sustainability with proactive, global, social goals, moving us away from the do nothing today Brundtland paradigm.

# WORKING GROUP PAPERS

In this publication, we bring together the thinking of working group one, exploring the key issues of sustainability in the built environment that will establish the foundation for future working groups and actions to build upon.

## **DEFINTIONS**
### THE LANGUAGE OF SUSTAINABILITY

The Language of Sustainability is vitally important in progressing sustainability thinking and practice. Paul Hawkens, writing in Drawdown (Hawken 2016) commented "Confucius wrote calling things by their proper name is the beginning of wisdom. In the world of climate change, names can sometimes be the beginning of confusion"

Built Environment climate science and sustainability is littered within its own specialised vocabulary, acronyms and jargon. These definitions and language developed by consultants, ecologists, scientists and policymakers over the last three decades are at best succinct, specific and useful. However, as a means of communication they can, and often do create confusion.

## **SOCIAL**
### WELLBEING & PARTICIPATION

We are developing a World View which is the understanding of our position on the planet, and has a crucial role in building the awareness for regenerative sustainability, and understanding the true influence of the built environment

The role of humanity on Earth should be repositioned from an ego-centred position to understanding that we are inherently a part of, and fully dependent on the web of life on the planet. To adopt this role, we need to become aware of the need of regenerative sustainability.

A progressive development from EGO to ECO to SEVA (Ego Eco Seva: (http://glancesideways.com/) starts by moving away from EGO by realizing the that we are a part of the inherent connectedness and interdependencies of ecological systems, and continues to adopting SEVA as a necessary role for regenerative sustainability. This role is needed to create a culture that is not merely sustainable, but flourishes from being an interconnected part of the living systems of the planet. »» *Social, Health, Participation*

## LIVING **BUILDINGS**

Apart of our global reality, climate change impacts are not only predicted through scientific research, but witnessed in visible environmental changes. There is, however, a significant gap between the research that exists on climate change on the global level and everyday concerns of vulnerability of local communities. This is particularly true in those places which are likely to be the most threatened due to a sea-level rise and other negative effects of climate.

Expected environmental changes include sea level rise, coastal erosion, higher temperatures, stronger and increased frequency of storms and extreme flooding events. These types of environmental change will not occur in a vacuum but will ultimately impact the overall social, economic and political structures of a country.

To deal with climate change and other forms of environmental change, various disciplines and vocabularies are used. The set which currently dominates most discussions comes strictly from climate change, centring around the term 'adaptation' leading to the phrase climate change adaptation.

The concept of restorative and regenerative building is part of the adaptation strategy.
»» *Living BUILDINGS*

## REGENERATIVE **HERITAGE**

Understanding a regenerative, sustainable future for our built environment necessitates a deep understanding of our existing heritage as living buildings. Our living heritage buildings are sharing memories of place from the past and providing us with lessons for the future. Preservation, Restoration, Reconstruction, Re-use and Re-vitalizing as explored within this paper, are vital approaches to ensuring our living heritage maintains its cultural richness whilst ensuring an ecologically sound and socially just future.
»» *Regenerative HERITAGE*

## **ECOMONICS** AND RESOURCES

Recent years are marked with a great change in understanding that Earth is not a commodity but a community, and we have to start living in accordance and to team up with the nature.

This philosophy found strategic understanding and expression in the Global Goals for Sustainable Development, as well as practical implementation in slow but continuous transition from linear to circular, and consecutively to restorative and later to regenerative economy.

This transition requires achieving sustainability. It is not enough to only implement **restorative sustainability,** which is defined as restoring the capability of socio-economic and ecological systems to a healthy state. The target should be **achieving regenerative sustainability** which guarantees regenerating relationships that allow of socioeconomic and ecological systems to continuously evolve. »» *Circular ECONOMY*

**We have taken two central and vital COST Restore objectives as our central reason d'être**

**RESTORE**
**RE**thinking
**S**ustainability
**TO**wards a
**R**egenerative
**E**conomy

Affecting a **paradigm shift** in built environment sustainability

**Within these parameters we have concerned ourselves with identifying:**

**state of the art,** (not just of sustainability but of restorative and regenerative thinking),

**visions for a new paradigm** and

**actions to move us** towards the new paradigms

# RESTORE TRIGGERS

## Getting from State of the Art to Vision

### **EDUCATION:** inspiring the next generation

An essential element of moving from sustainability to regenerative. Education must be seen as an integral and vital element of all sustainability strategies. Our Working Group Training School purposefully took the thinking of Leopold for the foundation

> *... teach the student to see the land, to understand what he sees, and enjoy what he understands.* Aldo Leopold

Education that aims at a sustainable and restorative change of society requires a participatory approach and a change from top down to bottom up. This entails a shift away from the individual point of view and perception towards a collaborative, cooperative and responsible approach. Education is no longer understood as a linear process in which knowledge is transmitted from top to bottom, from adult to child, from teacher to student, from the knower to the ignorant, but is perceived and promoted as a collective action where each individual can develop their potential and participate and contribute their skills and abilities for the common good. »» *Social, Health, Participation*

### **NATURE:** connecting through Biophilic Design

The vision of restorative and regenerative Buildings requires greater convergence and a more responsible use of natural resources. This can be done by making environmental resources available for energy supply, but also by designing with nature and connecting with the natural cycle of day and night, change of seasons, wind, temperature or fauna and flora. »» *Living BUILDINGS*

### **PLACE:** moving to local, culturally rich and ecologically sound built environments

Together with nature, place refers to the physical aspect of a certain area. In a more metaphorical meaning place is the carrier of information from the past, and the keeper of memory. Regenerative and Restorative Sustainability respects this connection to the past by aspiring an integrated lively approach against heritage buildings. Regenerative Heritage is locally, culturally and environmentally integrated into the place. As such, it is also a successful example of building the future.

The importance of Place is increasingly recognised as an essential element of regenerative sustainability. It is one of the seven petals of the Living Building Challenge:

*The intent of the Place Petal is to realign how people understand and relate to the natural environment that sustains us. The human built environment must reconnect with the deep story of place and the unique characteristics found in every community so that story can be honoured, protected and enhanced.*
*In addition our relationship with Place can be essential to the wellbeing of those who work, live and play within buildings, something now understood as Topophilia, our love of place.*

It is vital that buildings recognise the place in which it is sited. Regenerative buildings serve as contributors to and enhancers of place, its land, history, culture, stories and resources, no longer simply a consumer of resources. This thinking resonates with Aldo Leopold's criteria of sustainability, were we see land (place) as part of our community not simply a commodity. A theme that formed the foundation for our UK Training School in 2017. »» *Regenerative HERITAGE*

**CIRCULAR ECONOMY:** moving from linear growth to Regenerative Economies

Built environment economics is on a journey from linear economics to circular economy to regenerative economies.

Understanding the true cost of sustainability has become ever more vital. We are now witnessing the new normal, where the question of sustainability cost is flipping from, how much extra will the sustainable building cost? to, what are the real costs in not providing sustainable buildings? (Brown 2018)

We are seeing the alignment of economic thinking with wider social and sustainability aspects. This can be seen in the interest and development of doughnut economics (Raworth, 2017) that has two boundaries; a social foundation of wellbeing that no one should fall below, and an ecological ceiling of planetary pressure that we should not go beyond. Between the two lies a safe and JUST space for ALL

The circular economy concept is a crucial part in both Restorative and Regenerative Sustainability. For the paradigm shift from "business as usual" to "more good" the decoupling between economic growth and resource consumption is fundamental. Regenerative Economy is bearing in mind the exhaustibility of natural resources, with specific awareness that our natural capital has to be preserved. » *Circular ECONOMY*

# LITERATURE / REFERENCES

Hawkens, Paul. Drawdown: The Most Comprehensive Plan Ever Proposed to Roll Back Global Warming, ISBN: 9780143130444

Brown, Martin, Business Case for Sustainable Buildings, Fairsnape iSite Blog, Feb 2018

UKGBC, Capturing the Value of Sustainability, Identifying the links between sustainability and business value 2018. https://www.ukgbc.org/wp-content/uploads/2018/01/Capturing-the-Value-of-Sustainability.pdf

Raworth Kate, Doughnut Economics, 2017, ISBN: 9781847941381 Cornerstone Digital (6 April 2017)

Ego Eco Seva: http://glancesideways.com/

# 02 DEFINITIONS – THE LANGUAGE OF SUSTAINABILITY

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# LANGUAGE OF SUSTAINABILITY

The Language of Sustainability is vitally important in progressing sustainability thinking and practice. Paul Hawken, writing in Project Drawdown commented "Confucius wrote calling things by their proper name is the beginning of wisdom. In the world of climate change, names can sometimes be the beginning of confusion"

Built Environment climate science and sustainability is littered within its own specialised vocabulary, acronyms and jargon. These definitions and language developed by consultants, ecologists, scientists and policymakers over the last three decades are at best succinct, specific and useful. However, as a means of communication they can, and often do create confusion.

A core activity for Working Group One was to establish a glossary of definitions, creating the Language of Sustainability as a reference for RESTORE working groups.

Core to this Language of Sustainability is the RESTORE overarching remit and definition, upon which all activities in the five working group groups should take as the foundation.

**REthinking Sustainability TOwards a Regenerative Economy**

From the outset of the action, it has been made clear that RESTORE is not just another sustainability in construction network group, but one that pushes beyond sustainability to address and to enable restorative and regenerative approaches and thinking within the built environment.

Such restorative and regenerative approaches and thinking should enable the creation of conditions for a future where an ecologically sound environment, a just, healthy society and a vibrant economy can flourish equally.

**SUSTAINABILITY:**
Limiting impact. The balance point where we give back as much as we take

**RESTORATIVE:**
Restoring social and ecological systems to a healthy state

**REGENERATIVE:**
Enabling social and ecological systems to maintain a healthy state and to evolve

This set of definitions needs to be considered within the context of the shifting sustainability landscape, driven by the Paris Agreement, Health and Wellbeing, Sustainable Development Goals, and the emerging regenerative responsibilities

Organisations that embrace regenerative sustainability ethos are refered to as regenerative enterprises. This term implies the need for organisations and people to reverse previous environmental destructive impact and was most famously used in a speech by Ray Anderson in 1994 where he laid out his ambition to make carpet manufacturer Interface the world's first sustainable company.

# CONTEXT

## PARIS AGREEMENT:

Limiting temperature increases to 1.5 DegC will re-set built environment sustainability codes, standards, strategies and targets.

**Paris Agreement (COP21)**
The Paris Agreement (French: Accord de Paris), Paris climate accord or Paris climate agreement is an agreement within the United Nations Framework Convention on Climate Change (UNFCCC) dealing with greenhouse gas emissions mitigation, adaptation and finance starting in the year 2020. The language of the agreement was negotiated by representatives of 196 parties at the 21st Conference of the Parties of the UNFCCC in Paris and adopted by consensus on 12 December 2015. As of November 2017, 195 UNFCCC members have signed the agreement, and 170 have become party to it. The Agreement aims to respond to the global climate change threat by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius

In the Paris Agreement, each country determines, plans and regularly reports its own contribution it should make in order to mitigate global warming. There is no mechanism to force a country to set a specific target by a specific date, but each target should go beyond previously set targets.

## HEALTH AND WELLBEING:

Sustainability is now longer concerned only with resources and energy, but increasingly and significantly human-centric.

## SUSTAINABLE DEVELOPMENT GOALS:

The UN SDG's are igniting sustainability with proactive, global social goals, moving us away from the 'do nothing today' paradigm

The Sustainable Development Goals (SDGs), officially known as Transforming our world: the 2030 Agenda for Sustainable Development is a set of 17 "Global Goals" with 169 targets between them set of goals to end poverty, protect the planet, and ensure prosperity for all as part of a new sustainable development agenda. Each goal has specific targets to be achieved over the next 15 years.

# DEFINITIONS

**Within the context described above, this paper introduces and seeks to clarify with an agreed definition for the new language of sustainability. It is arranged within the original nine working group themes.**

**PLACE:** Our relationship with place, ecology, nature, soil, bio-climate

**ENERGY:**
Working towards restorative and regenerative energy, net-zero, carbon-neutral approaches and energy storage

WATER:
Understanding net positive water, building influence, floods, drought, water stress

WELLBEING:
Provision of buildings and facilities that foster health, happiness, salutogenesis, biophilia, mindfulness, air, light, comfort

**CARBON:**
Reimaging Carbon with science based targets, 350ppm, 2Deg, 1.5Deg, social impact

**RESOURCES:**
A future of healthy and responsible materials, responsible, transparency, conservation circular economy

**EQUITY:**
Working towards equity, equality, fairness, inclusion, respect

**EDUCATION:**
The missing component of sustainability strategies for behavior in next generation, next project development

**ECONOMICS:**
From linear economies to regenerative economy, shared economy, circular economy

The following chapters from the sub group teams have adapted and expanded these definitions within the scope of their specific areas of study, ie Social, Wellbeing & Participation, Restorative Buildings, Restorative Heritage and Regenerative Economics.

## PLACE: Our relationship with place, ecology, nature, soils, bio-climate

**Place-Words:**

> *"The power of language - strong style, single words, that shape our sense of place"*
> Robert MacFarlane, Landmarks

### REGENERATIVE DESIGN

Regenerative design, relates to holistic approaches that support the co-evolution of human and natural systems in a partnered relationship. It is not the building that is 'regenerated' in the same sense as the self-healing and self-organizing attributes of a living system, but by the ways that the act of building can be a catalyst for positive change within the unique 'place' in which it is situated. Within regenerative development, built projects, stakeholder processes and inhabitation are collectively focused on enhancing life in all its manifestations – human, other species, ecological systems – through an enduring responsibility of stewardship. By engaging all the key stakeholders and processes of the place – humans, earth systems, and the consciousness that connects and energizes them– the design process builds the capability of the people to engage in continuous and healthy relationship. There is continuous learning and feedback so that all aspects of the system are an integral part of the process of life in that place – co-evolution.

**Biodiversity**
Biodiversity generally refers to the diversity. variety and variability of all life on Earth, the existence of a wide range of living organisms, such as animal and plants, in an environment. Biodiversity is important to the health of ecosystems as it provides food, materials and contributes to the economy.

The term biological diversity was used first by wildlife scientist and conservationist Raymond F. Dasmann (1968) advocating conservation. The term was widely adopted only after more than a decade, when in the 1980s it came into common usage in science and environmental policy.

**Bio-Climatic Design**
The concept that architectural design that should be in balance with biology, technology and climatology. Currently used to reflect the integrating of digital technologies with bio-data, nature and climatology within todays sustainable design and build. (See Olgyay V., 1962, Design with Climate)

**Ecology**

> *"The first rule of ecology is that everything is connected"* (Commoner, 1971)

**Land Ecology**

> *"We abuse the land because we regard it as a commodity belonging to us. When we see the land as a community to which we belong we may begin to use it with love and respect."*
> (Aldus Leopold, 1949)

**Regenerative Heritage**

Cultural significance – aesthetic, historic, scientific or social value for the past, present or future generations.

Conservation – all the processes of looking after a place so as to retain its cultural significance. It includes maintenance, and according to circumstance may include preservation, restoration, reconstruction and adaptation and will be commonly a combination of more than one of these.

Maintenance – the continuous protective care of the fabric, contents and setting of a place are to be distinguished from repair. Repair involves restoration and reconstruction, and it should be treated accordingly.

Preservation – maintaining the fabric of a place in its existing state and retarding deterioration.

Restoration – returning the existing fabric of a place to a known earlier state by removing accretions or by reassembling existing components without the introduction of new material.

Reconstruction – returning a place nearly as possible to a known earlier state and is distinguished by the introduction of materials (new or old) into the fabric.

Re-use – Re-using the building, continuing its original function despite its technology

Re-vitalizing – Re-using the structure while instating a new function.

## Topophilia and Terraphilia

The word Topophilia, which means love of place, was popularized by Yi-fu Tuan, a human geographer in his book Topophilia: A Study of Environmental Perception, Attitudes and Values, published in 1974. For Tuan, Topophilia is "the affective bond between people and place or setting". Tuan's Topophilia has been widely referenced and very influential in human geography and other environmental disciplines.

The sense of Topophilia changes as the place and region change in the environment of globalized economy and culture. Topophilia is not an analytical category but conceptual construct (Oliveira et al., 2010). It is a static and passive concept and it does not incorporate elements that could motivate attitudes and actions for local/regional growth and development (Roca 2004).

Topophilia is not policy-relevant in operational terms because it is resistant to the issue of territorial identity in a developmental perspective. As an alternative to the limitations of concept of Topophilia, the concept of terraphilia has been introduced (Roca & Roca, 2007). Terraphilia is defined as affective bond between people and territory which induce action in favour of development.

**Place** refers to the physical and human aspects of a certain area. It can vary from a precise location (site) to a rather large area that is sometimes difficult to define. It includes various geographical characteristics of the location (relief, hydrology, climate, vegetation, human settlements, culture, economy, way of life etc.) (World Atlas, 2017), which makes every place unique and different from other places, giving it its identity. People that live or reside in a place can develop place attachment, which means that they associate their memories, feelings, experiences and perception with the place.

**Sense of place** reflects processes by which individuals or groups identify, attach to, depend on, and modify places, as well as the meanings, values, and feelings that individuals or groups associate with a place." (Chapin and Knapp, 2015, p. 38) It is often used in relation to those characteristics that make a place special or unique, as well as to those that foster a sense of authentic human attachment and belonging (Knox and Marston, 2017). Such a feeling is often made up of a mix of natural and cultural features in the landscape, and generally includes the people who occupy the place (Convery et al., 2012).

## ENERGY: Working towards restorative and regenerative energy, net-zero, carbon-neutral approaches and energy storage

### Restorative and Regenerative Energy

Perhaps the best definition and understanding of how Energy provision and use can be restorative and regenerative is encapsulated in the Living Building Challenge's Energy Petal Intent.

"The intent of the Energy Petal is to signal a new age of design, wherein the built environment relies solely on renewable forms of energy and operates year round in a safe, pollution-free manner. In addition, it aims to prioritize reductions and optimization before technological solutions are applied to eliminate wasteful spending – of energy, resources, and dollars. The majority of energy generated today is from highly polluting and often politically destabilizing sources including coal, gas, oil, and nuclear power. Large-scale hydro, while inherently cleaner, results in widespread damage to ecosystems. Burning wood, trash, or pellets releases particulates and carbon dioxide (CO2) into the atmosphere and often strains local supplies of sustainably harvested biomass while robbing the soil of much-needed nutrient recycling. The effects of these energy sources on regional and planetary health are becoming increasingly evident through climate change, the most worrisome major global trend attributed to human activity." (Living Building Challenge 2018)

To meet the requirements of Living Building Challenge Net Positive Energy Imperative, One hundred and five percent of the project's energy needs must be supplied by on-site renewable energy on a net annual basis, without the use of on-site combustion. Projects must provide on-site energy storage for resiliency.

## WATER: Understanding net positive water, building influence, floods, drought, water stress

### Net-positive water

Perhaps the best definition and understanding of how Water provision, use and disposal can be restorative and regenerative is described within the Living Building Challenge Water Petal Intent that is to realign how people use water and to redefine "waste" in the built environment so that water is respected as a precious resource. Scarcity of potable water is quickly becoming a serious issue as many countries around the world face severe shortages and compromised water quality.

"To meet the requirements of Living Building Challenge, Project water use and release must work in harmony with the natural water flows of the site and its surroundings. One hundred percent of the project's water needs must be supplied by captured precipitation or other natural closed-loop water systems, and/or by recycling used project water, and must be purified as needed without the use of chemicals. All storm water and water discharge, including grey and black water, must be treated onsite and managed either through reuse, a closed loop system, or infiltration. Excess storm water can be released onto adjacent sites under certain conditions." (Living Building Challenge 2018)

## WELLBEING: Provision of buildings and facilities that foster health, happiness, salutogenesis, biophilia, mindfulness, air, light, comfort

**Health** – a state of complete physical, mental, and social well being, and not merely the absence of disease or infirmity. (World Health Organisation, WHO, 1949)
**Wellbeing** – concerned with peoples' holistic state of health and mind', (Think Health and Happiness)
**Wellness** – concerned with peoples' state of health (Think Health and Safety)

### Salutogenesis

A focus on improving peoples' health, not just on minimising the impact on people's health.
A focus on factors that improve and maintain health through built environment (rather than focus on reducing factors that cause ill health)
A term coined by Aaron Antonovsky that literally means 'generation of health', originally describes an approach which focuses on factors supporting human health and well-being, rather than on factors that cause disease. (Antonovsky, 1979)

### Solastagia

A form of psychic or existential distress caused by environmental change, such as climate change. Coined by philosopher Glenn Albrecht in 2003, it was formed from a combination of the Latin word sōlācium (comfort) and the Greek root -algia (pain). The first article published on this concept appeared in 2005. (Glenn, 2007)

### Biophilia

Literally meaning 'love of nature', the term suggests a deep, innate affinity between humans and nature. Biophilic design is the theory, the science and the practice of bringing buildings 'alive', recognising and improving bonds with nature. It is a response to the human desire to re-establish our contact with nature within built environments. It has been referred to as the secret sauce for sustainability behavior.

### Rewilding

**Rewilding Nature**
"Rewilding offers us this fantastic opportunity to start allowing systems to restore themselves: stepping back, and letting nature get on with it." (Monbiot, 2014)

**Rewilding Buildings**
Rewilding of natural ecosystems provides with a useful illustration for a restorative built environment and restorative designed buildings, that can respond to natural, bio-climatic and human (inhabitant) activity.

**Rewilding People**
Restoring the connectivity of people with nature, through buildings that themselves illustrate a connectivity with nature (through for example biophilic and biomimic features) has been referred to as the secret sauce for sustainable behaviour.

## SUSTAINABLE WELLBEING

Defined as "happiness that contributes to individual, community, and/or global well-being without exploiting other people, the environment, or future generations". (O'Brien 2012)

### Well Build Standard

Managed by The International WELL Build Institute, WELL is a certification standard for buildings, interior spaces and communities seeking to implement, validate and measure features that support and advance human health and wellness.

Relationships with other standards: Crosswalks are available to identify synergies between WELL and other green building standards, and streamline efforts for projects seeking a dual rating by acknowledging where WELL Building Standard requirements are deemed equivalent and aligned with aspects of the alternate building rating tool. Currently, WELL has formed Crosswalks with Green Building Council of Australia (Green Star), BRE (BREEAM), U.S. Green Building Council (LEED) and the International Living Future Institute (Living Building Challenge).
https://www.wellcertified.com

## CARBON: Reimaging Carbon with science based targets, 350ppm, 2Deg, 1.5Deg, social impact,

### Reimagining Carbon: A New Language Of Carbon

'Low carbon', 'zero carbon', 'decarbonisation', 'negative carbon', 'neutral carbon', even 'a war on carbon' – all are part of the current discourse. If we can reduce our carbon emissions, and shrink our carbon footprint, the thinking goes, we can bring down the carbon enemy. It's no wonder that businesses, institutions and policymakers struggle to respond. But carbon – the element – is not the enemy. Climate change is the result of breakdowns in the carbon cycle caused by us: it is a design failure. Anthropogenic greenhouse gases in the atmosphere make airborne carbon a material in the wrong place, at the wrong dose and for the wrong duration. It is we who have made carbon toxic – like lead in our drinking water or nitrates in our rivers. In the right place, carbon is a resource and a tool.
A new language of carbon recognizes the material and quality of carbon so that we can imagine and implement new ways forward. It identifies three categories of carbon: living, durable and fugitive and a characteristic of a subset of the three, called working carbon. It also identifies three strategies related to carbon management and climate change: carbon positive, carbon neutral and carbon negative. (McDonough, 2016)

### Science Base Targets

Carbon (and Green House Gas) emissions reduction targets are considered "science-based" if they are in line with the level of decarbonization required to keep global temperature increase within 2°C of pre-industrial levels.
Definitions of what constitutes a science-based target (SBT) will change reflect advances in economic modelling, climate science, and global emissions reduction efforts.
Currently targets may be considered 'science-based' only if they are aligned with 1.5 °C scenarios, in keeping with the Paris Agreement.

### Carbon Dioxide

A greenhouse gas produced through respiration and the decompostion of organic substances. Combustion of fossil fuels is primarily responsible for increased atmospheric concentrations of this gas. Carbon dioxide is just one of the six main greenhouse gases limited by the Kyoto protocol. For simplicity of reporting, the mass of each gas emitted is commonly translated into a carbon dioxide equivalent so that the total impact can be summed to one figure and expressed as a carbon footprint.
The total amount of Carbon Dioxide produced from human activities, usually expressed in tons of carbon dioxide (CO2).
The total amount of greenhouse gases produced from directly and indirectly enabling, usually expressed in tons of carbon dioxide (CO2e).

**Carbon Footprint**
The total set of greenhouse gas emissions caused directly and indirectly by an individual, organisation, event or product:

Scope 1 Direct carbon dioxide emissions that result from the activities that the business controls.
Scope 2 Emissions from the use of electricity.
Scope 3 Indirect carbon dioxide emissions that result from the activities that the business performs but does NOT have full control over.

**Carbon Hierarchy**
Hierarchy plan to Avoid, Reduce, Replace and Offset carbon

**Carbon Neutral**
Achieving net zero carbon emissions by balancing carbon released with an equivalent amount saved or sequestered. Making or resulting in no net release of carbon dioxide into the atmosphere, especially as a result of carbon offsetting.

**Carbon Negative Technologies**
Technologies which reduce the levels of carbon dioxide in the atmosphere. Among such technologies are bio-energy with carbon capture and storage, biochar, direct air capture, ocean fertilization and enhanced weathering.

## RESOURCES: healthy materials, responsible, transparency, conservation

### Precautionary Principle
When human activities may lead to morally unacceptable harm that is scientifically plausible but uncertain, actions shall be taken to avoid or diminish that harm. Adoption of the precautionary principle is considered key to progressing with healthy materials and eliminating toxic materials from buildings. The precautionary principle states that if an approach or product has any suspected risk of causing human or environmental harm, then, in the absence of scientific consensus that the approach or product is harmful, the burden of proof that it is not harmful falls on those undertaking the design, specifying or procuring products.

### Toxic Building Materials
Chemical substances of concern that pose a threat to the environment and human health.

### Red List Materials
The materials red list is a compilation of harmful-to-humans chemicals and materials compiled by the International Living Future Institute (ILFI) as part of the Living Building Challenge.
The intent is to help create a materials economy that is non-toxic, ecologically restorative, transparent, and socially equitable. Throughout their life cycle, building materials are responsible for many adverse environmental issues, including personal illness, habitat and species loss, pollution, and resource depletion. The Imperatives in this section aim to remove the worst known offending materials and practices and to drive business toward a truly responsible materials economy. When impacts can be reduced but not eliminated, there is an obligation not only to offset the damaging consequences associated with the construction process, but also to strive for corrections in the industry itself. At the present time, it is impossible to gauge the true environmental impact and toxicity of the built environment due to a lack of product-level information, although the Living Building Challenge continues to shine a light on the need for transformative industrial practices. Link: ILFI webpages https://living-future.org/declare/declare-about/red-list/

### Design for Disassembly / Design for DeConstruction

The 10 principles for Design for Disassembly state:

1. Document materials and methods for deconstruction.
2. Select materials using the precautionary principle.
3. Design connections that are accessible.
4. Minimize or eliminate chemical connections.
5. Use bolted, screwed and nailed connections.
6. Separate mechanical, electrical and plumbing (MEP) systems.
7. Design to the worker and labor of separation.
8. Simplicity of structure and form.
9. Interchangeability.
10. Safe deconstruction.

Brad Guy and Nicholas Ciarimboli (2008): Design for Disassembly in the Built Environment: A Guide to Closed- Loop Design and Building.

### Material Conservation Plan

The Living Building Challenge requires every project team to create a circular economy-based Material Conservation Management Plan (MCMP) that details how materials are optimised throughout a project's lifespan.

### Material Passports

The concept of the Material Passports which details life histories and potentials for reuse, is key to the circular economy approach of reusing products, components or materials from building to building.
Douglas Mulhall (Mulhall et al 2012) describes Material Passports describes Material Passports as adding a new dimension to material quality. They detail materials' suitability for recovery and reuse in other products or buildings, enabling buildings to become 'resource repleters not resource depleters'. 'Equity is cast from the power structures of the built environment.' (Brown, 2016)

## EQUITY: Working towards equity, equality, fairness, inclusion, respect,

*'Equity is cast from the power structures of the built environment.'*

### Equity and Equality

Equity is giving everyone what they need to be successful.
Equality is treating everyone the same

### Corporate Social Responsibility (CSR)

CSR approaches aim to ensure that an organisation conduct their activities in a way that is socially and economically just as well as being ecologically sound. (MB Defintion)
A fine definition of 'regenerative' CSR would be the Patagonia Environmentl Mission that applies to all of the business, including the design, construction and use of their buildings:
Build the best product, cause no unnecessary harm, use business to inspire and implement solutions to the environmental crisis

### Human rights

Human rights are the basic rights and freedoms that all humans should be guaranteed. They are universal, apply equally to all, and are founded on the principle of dignity for every human being.

### Inhabitant

Replaces 'occupant' as someone who inhabits the eco system of a restorative or regenerative building for living, working or play.

**JUST**
The International Living Future Institute's JUST program is a voluntary disclosure program and a call to social justice action, providing an innovative transparency platform for organizations to reveal much about their operations, including how they treat their employees and where they make financial and community investments. (see: https://living-future.org/just/)

**Living culture**
Living culture, or intangible cultural heritage, refers to the practices, representations, expressions, knowledge and skills handed down from generation to generation. This heritage provides communities with a sense of identity and is continuously recreated in response to their environment

**Love**
Love is seen as having no place in business often seen as a weakness. 'But love is the strongest power we can muster,' and can enable us to 'produce goods and services that make the world a better place', enable businesses to better manage responsibility, treat people and the planet with respect, and be answerable to our children without guilt. (Brown, 2016)

## EDUCATION: The missing component of sustainability strategies for behavior in next generation, next project development

### REGENERATIVE EDUCATION

Education towards regenerative sustainability implies a shift to conscious learning and participation of communities as participants, as the place evolves, based on the context of planetary survival, and the evolutionary need of 'integrative awareness' (Reed, 2007). Education in this context is seen as an epistemological and perceptual change of transpersonal/transorganizational ethics and willingness to participative (Sterling, 2003).

Part of our sustainability responsibility must be to inspire the next generation to become better than us and to reach higher than we have. Every project has a responsibility to educate and inspire the next generation, the next project, the next innovation. Addresses the missing sustainability and ecology subjects as taught subjects within education and business sustainability development.

## ECONOMICS: From linear economies to regenerative economy, shared economy, circular economy

Current and emerging economic thinking is challenging established views on economics at the macro, micro and messo levels of the built environment.  Thinking from the likes of Cradle to Cradle, Donut Economics and This Changes Everything is breaking down the economic orders of linerar economies and GDP's.

The Sustainable Development Goals are giving new purpose to businesses, their buildings and the manner in which buildings are designed, constructed and used. We now have new normal language for ecomomics emerging, one that has left behind the economic language of war, conflict, oppression for a language of sharing, circular, responsible and of seva (love).

In regenerative sustainability, we create synergies that constantly regenerate the natural capital and services. To avoid social, environmental and economic collapse, the world needs to move beyond the standard choices of capitalism or socialism.

**Natural capital**
Natural capital can be defined as the world's stocks of natural assets which include geology, soil, air, water and all living things. It is from this natural capital that humans derive a wide range of services, often called ecosystem services, which make human life possible.

**Blue Economy**
During the past few years, the term "Blue Economy" or "Blue Growth" has surged into common policy usage, all over the world. For some, Blue Economy means the use of the sea and its resources for sustainable economic development. For others, it simply refers to any economic activity in the maritime sector, whether sustainable or not.
Despite increasing high-level adoption of the Blue Economy as a concept and as a goal of policy making and investment, there is still no widely accepted definition of the term.

## CIRCULAR ECONOMY

> *A circular economy is characterised, more than defined, as an economy that is restorative and regenerative by design*

In the late 1970s, architect Walter Stahel came to the insight that the current linear economic model is not sustainable. This was based on the fact that if people continued to increase their consumption it would lead to major problems in the future, as highlighted by the Club of Rome in their report "Limits to Growth" published in 1972. They concluded that the current economic production model was not sustainable due to increasing demand for raw materials and worldwide accumulation of waste. Stahel had the idea to close material cycles and reform the economy. The concept of closing the cycles has been studied and further developed in concrete business cases in the years. Eventually, it resulted in the concept of the circular economy which, for the purpose of this briefing, can be defined as:

The circular economy is a concept in which growth and prosperity are decoupled from natural resource consumption and ecosystem degradation. By refraining from throwing away used products, components and materials, instead re-routing them into the right value chains, we can create a society with a healthy economy, inspired on and in balance with nature.

Circle Economy's '7 elements of the circular economy'? stress the combined material and systemic nature of the circular economy, identifying three material pillars:

a. Prioritise regenerative resources,
b. Preserve and extend what is already made, and
c. Use waste as a resource;

And four systemic enablers:

d. Rethink the business model,
e. Design for the future,
f. Collaborate to create joint value, and
g. Incorporate digital technology.

Recognizing its tremendous potential to create sustainable value, public and private stakeholders are adopting the circular economy: the Netherlands recently announced its ambitions to become the first circular country by 2050; the European Union released its circular economy package in 2015; many other countries such as France, China, Japan, Sweden and Finland are developing circular policy frameworks; and a growing number – small and large – are implementing the circular economy.

## REGENERATIVE ECONOMY

While circular economy is an attractive policy which aims to keep products at their highest utility through a positive developing cycle, a regenerative system has to do with rebirth of life itself (Lyle, 1996). It is a principle of ongoing self-renewal process which built relationships and allows socio-economic and ecological systems to constantly evolve.
Regenerative economics is an economic system that works to regenerate capital assets. A capital asset is an asset that provides goods and services that contribute to our well-being. Regenerative Economics focuses on the planet and the goods and services it supplies." (Kibert, 1999)

A Regenerative Economy maintains reliable inputs and healthy outputs by not exhausting critical inputs or harming other parts of the broader societal and environmental systems upon which it depends.

A Regenerative Economy is a product of human and societal vitality, rooted in ecological health and the inclusive development of human capabilities and potential.

## SHARING ECONOMY

The sharing economy enables a shift away from a culture where consumer's own assets (from cars to drills), toward a culture where consumers share access to assets. This shift is driven by internet peer-to-peer platforms which connect consumers and enable them to make more efficient use of underutilise

## Blockchain

A distributed electronic ledger that uses software algorithms to record and confirm transactions with reliability and anonymity. The record of events is shared between many parties and information once entered cannot be altered, as the downstream chain reinforces upstream transactions. The concept came to prominence in 2008 with the invention of the digital currency Bitcoin. Emerging as a key concept for transparency in sustainable and just procurement

## RESTORATIVE ENTERPRISE

Restorative enterprise refers to the ambition an organisation has to do more good for the earth than harm. The term implies the need for people to reverse previous environmental destruction and was most famously used in a speech by Ray Anderson in 1994 where he laid out his ambition to make carpet manufacturer Interface the world's first sustainable company. (Anderson, 1994)

## RESTORATIVE VALUE

**Value management**

- The strategic-level exercise of maximising the project's net-positive sustainability capability.
- Defining and establishing the sustainability philosophy and vision for the project

**Value engineering**

- The operational-level exercise of maximising the project's net-positive sustainability function of a building, component or process.
- Ensuring design and operational decisions remain focused on the projects restorative sustainability philosophy and vision. (Brown, 2016)

# RESTORE MEMBERS

## Regenerative Sustainability definitions from Working Group One Members obtained through Survey 2017

*"Creating the conditions for a future where an ecologically sound environment, a just, healthy society and a vibrant economy can flourish equally.*

*"Restorative Sustainability is to employ strategies in the buildings and cities´ process of design that produce a positive impact on the natural environment, society, and in the human health, well-being and comfort of users.*

*"The property of system to repair and restore itself and increase diversity of nature and society*

*"Every human behaviour is an attempt to meet a need, whether it is physical, emotional, or spiritual. The restorative sustainability is for me the result of multidisciplinary work that provides a resilient response from the built environment, both, to meet the needs and that justify our attempts to meet those needs, and to obtain new solutions that not only bring better energy performance, but also better regeneration of places and people participation, ecology concept, inclusive culture, with climate at the core of design, construction and operation activities.*

*"Beyond low carbon and carbon neutral*

*"Something that improves the ecological state of the world rather than just reduces the harmful impacts*

*"Advance towards urban environments that integrate mitigation and adaptation to climate change with good quality environments that sustain the daily life of all though feasible solutions*

*"Restorative sustainability is commitment to fully embrace sustainability as part of the core values, where the industry and business are seen fully as part of a larger system and their activities are redesigned with sustainability in mind. These companies or business units strive for at least a net impact of zero on the environment and societies in which they operate, and envision an activity model where their operations can eventually have a generative and restorative impact – leaving the world better off than before it existed.*

*"Taking measures that will lead to preservation and restoration of environment and will contribute to maintaining a long-term sustainability*

*"Economic development based on constructions that use little or no energy and produce their own energy, help to maintain the ecological balance, have positive social and economic development and enrich the areas in which they are developed*

*"Restorative sustainability in the context of energy efficiency is a complex approach that must consider modern technologies, but also take into consideration the design of the building itself, as well as necessary adjustments of human behavior. What we need is a way of transition to renewable energies and zero/plus energy solutions.*

*"Long term effective and environmental friendly system*

*"Restore the balance between humankind and nature*

*"Restorative sustainability is when from all human activities, actions, processes the effect for the society is restorative, respectively there is a net positive impact. This means the business actors to replace used in the production process resources , to recover the negative influences on environment and to guarantee sustainability of these approaches in future.*

*"A comprehensive and holistic action taken to improve the built environment coping with global climate change and its social, economic, community, health, energy, water, soil, sustained materials for achieving equity, justic and transparency to all human beings.*
*sustainable development of spatial functions*

*"Restorative sustainability is the strongest form of sustainability (comparing to weak and strong); in addition to economic, social and environmental aspect it includes others issues as fairness, democracy, etc.*

# LITERATURE / REFERENCES


Anderson, 1994. Climbing Mount Sustainability, Accessed April 2018 at http://www.raycandersonfoundation.org/assets/pdfs/rayslife/EssayClimbingMountSustanability.pdf

Antonovsky, A., Health, 1979. Stress and Coping, San Francisco, Jossey-Bass Publishers

Albrecht, G., 2007. Solastalgia: the distress caused by environmental change. Astralasian Psychiatry

Articles of the Universal Declaration of Human Rights, 1948. www.un.org/en/universal-declaration-human-rights

Blue Economy http://www.theblueeconomy.org/;

British Land: Sustainability Brief for Developers http://www. britishland.com/~/media/Files/B/British-Land-V4/down- loads/2017/BL_Sustainability_Brief_2017.pdf

Brown, M., 2008. Elevate Constructing the Future, Groundwork Carbon Footprint Study.

Brown, M., 2016. FutuREstorative: Working Towards a New Sustainability. RIBA Publishing.

Brown, M., 2018. Four Laws of Ecology Revisited. https://fairsnape.com/2018/04/06/4-laws-of-ecology-revisited/ Fairsnape Blog

Browning, W.D., Ryan, C.O., Clancy, J.O., 2014. 14 Patterns of Biophilic Design. New York: Terrapin Bright Green, LLC

Chapin, F.S., Knapp, C.N., 2015. Sense of place: A process for identifying and negotiating potentially contested visions of sustainability. Place as a boundary device for the sustainability sciences, Environmental Science and Policy, 53 Part A: 38-46.

Circle Economy. 5 Questions why the circular economy contributes to climate change mitigation Part 1 - 7 July 2017 accessed April 2018 circualreconomy.com

https://www.circle-economy.com/5-questions-why-the-circular-economy-contributes-to-climate-change-mitigation/

Ellen MacArthur Foundation. Circle Economy. https://www.ellenmacarthurfoundation.org/

Cole, RJ., 2012, Regenerative design and development: current theory and practice. Build Res Inf. 2012;40(1):1–6.

Commoner, B., 1971. The Closing Circle. Random House Inc.

Convery, I., Corsane, G., Davis, P., 2012: Introduction: Making sense of place, in: Making Sense of Place: Multidisciplinary

Dasmann, F, R., 1968. A Different Kind of Country.

Definition of Cultural Heritage. References to documents in history. Selected by J. Jokilehto (Originally for ICCROM, 1990) Revised for CIF: 15 January 2005

du Plessis C., 2012. Towards a regenerative paradigm for the built environment. Build Res Inf [Internet]. 2012 Jan;40(1):7–22. http://dx.doi.org/10.1080/09613218.2012.628548

Fullerton, J., 2015. Regenerative Capitalism. How Universal Principles And Patterns Will Shape Our New Economy http://capitalinstitute.org/wp-content/uploads/2015/04/2015-Regenerative-Capitalism-4-20-15-final.pdf

GreenSpec http://www.greenspec.co.uk/

Guy, B., Ciarimboli, N., 2008. Design for Disassembly in the Built Environment: A Guide to Closed- Loop Design and Building. http://www.lifecyclebuilding.org/docs/DfDseattle.pdf

Hawken, P., 2017. Drawdown - The Most Comprehensive Plan Ever Proposed to Reverse Global Warming, Penguin Books (April 18, 2017)

Health Product Declaration (HPD) http://www.hpd-collaborative.org/

Identerra model. A framework for the study of territoral identity as a resource, http://tercud.ulusofona.pt/index.php/en/projects/national-research-pro- jects/58.

ILFI Red List https://living-future.org/declare/declare-about/red-list/

Interface, 2017. What is Restorative Enterprise? Interface Blog. Available at: http:// blog.interface.com/restorative-is

Kellert, Stephen R & Calabrese Elizabeth F., 2015. The Practice of Biophilic Design

Kibert, Charles J. (Ed) 1999. Reshaping the Built Environment, Island Press, Chapter 5 Uneconomic Growth and the Built Environment, In Theory and in Fact. pages 73–88

Knox, P., Marston, S., 2017: Human Geography: Places and Regions in the Global Context (4th Edition), Cram101 Textbook Reviews.

Leopold, A., 1949, Sand County Almanac, Oxford University Press

Lindstrom, B. Ericksson, M., 2010. The Hitchhiker's Guide to Salutogenesis: Salutogenic Pathways to Health Promotion. Folkhälsan Research Centre

Living Building Challenge. 2018, Accessed April 2018 https://living- future.org/lbc/

Lyle, J.T., 1994. Regenerative design for sustainable development. John Wiley & Sons, Hoboken

MacFarlane, R., 2015. Landmarks, Why language and words are important to understanding our relationship with nature and landscapes. Penguin Books

Mang P, Reed B., 2012. Designing from place: a regenerative framework and methodology. Build Res Inf. 2012;40(1):23–38. http://www.integrativedesign.net/trajectory

Marije Vos; Freek Wullink; Maria de Lange; Mike Van Acoleyen; Daniel van Staveren; Verali von Meijenfeldt Editor: Anita Kuijpers . The Circular Economy: What Is It and What Does It Mean For You Arcadis Briefing Paper Accessed April 2018 at https://www.arcadis.com/media/9/D/3/%7B9D33B0CB-3F9D-4C16-9C74-B763D4BA442C%7DBriefing%20Paper%20-The%20Circular%20Economy_002.pdf

Martin, Chris J. The sharing economy: A pathway to sustainability or a nightmarish form of neoliberal capitalism? Ecological Economics 121 (2016) 149–159 . www.elsevier.com/locate/ ecolecon

McDonough, W., 2016. Carbon is not the enemy. Nature 539, 349–351 (17 November 2016)

Monbiot, G., Feral., 2014. Searching for Enchantment on the Frontiers of Rewilding. Penguin

Hansen K., Braungart M., Mulhall D., 2012. Resource Repletion, Role of Buildings. In: Meyers R.A. (eds)

Encyclopedia of Sustainability Science and Technology. Springer, New York, NY

Muir, J., 1911. My First Summer in the Sierra. Accessed April 2018 https://vault.sierraclub.org/john_muir_exhibit/writings/my_first_summer_in_the_sierra/

Ng., V., 2013: Toward a holistic understanding of sense of place: A phenomenological reading of Chew Jetty, Penang, International Journal of Humanities and Social Science 3 (20), 75-83.

O'Brien, C., 2010 Sustainability, happiness and education. Journal of Sustainability. Retrieved from http://journals.sfu.ca/cje/index.php/cje-rce/article/view/1185/1659

O'Brien, C., 2012. Sustainable happiness and well-being: Future directions for positive psychology. Psychology, 3(12), 1196.

Olgyay, V., Design for Climate, Bioclimatic Approach to Architecture Regionalism originally published in 1962, Repub 2016.

Oliveira, J. A., Roca, Z., Leitão, N., 2010. Territorial Identity and Development: From Topophilia to Terraphilia. Land Use Policy, 27(3) 801-814.

Paris Accord https://en.wikipedia.org/wiki/Paris_Agreement#cite_note- Article3-6

Portico https://support.google.com/healthymaterials/answer/6080283?hl=en

Reed, B., 2007. Shifting from 'sustainability' to regeneration, Building Research & Information, 35:6, 674-680.

Roca, Z., 2004. Affirmation of Regional Identity between Rhetoric and Reality: Evidence from Portugal. In E. Boneschansker et al. (eds.) Outstanding Regions – Exploring Quality in a Competitive World, Leeuwarden: Fryskie Akademy, pp. 24-49.

Roca, Z., Oliviera, A., Roca, M. N., 2011: Claiming Territorial Identity and Local Development: From Wishes to Deeds. In: Z. Roca, P. Claval, J. Agnew (eds.) Landscapes, Identities and Development. Farnham (UK): Ash- gate Publishers. pp. 319-334.

Roca, Z., Roca, M. N. O., 2007. Affirmation of Territorial Identity: A Development Policy Issue. Land Use Policy, 24(2), 434-442.

Science Based Targets, Adapted from http://sciencebasedtargets.org/wp-content/ uploads/2016/10/SBT-Manual-Draft.pdf

Sterling, S., 2003. Whole systems thinking as a basis for paradigm change in education: explorations in the context of sustainability. PhD thesis, University of Bath, Bath.

Sturgeon, A., 2017. Creating Biophilic Buildings. EcoTone

Tuan, Y., 1974. Topophilia: A Study of Environmental Perception, Attitudes and Values.

WELL BUILD Standard. http://delos.com/about/well-building-standard

World Health Organisation (WHO) 1948 Constitution of WHO: principles. http://www.who.int/about/mission/en/

Wilson, E.O., 1984. Biophilia, Harvard University Press

World Atlas, 2017: The Five Themes. In Geography, http://www.worldatlas.com/the-five-themes-in-geography.html (24 September 2017).

# 03 SOCIAL, HEALTH AND PARTICIPATION

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*Figure 1: SOCIAL, HEALTH AND PARTICIPATION: RESTORE Vision towards a regenerative Future. Main idea, scales, key topics and related concepts. © authors*

# KEY DEFINITIONS

### EDUCATION

Education towards regenerative sustainability implies a shift to conscious learning and participation in communities. Education should be connected to developing develop places based on the context of planetary survival and the evolutionary need of 'integrative awareness' (Reed, 2007). Education requires a change from an ego-centered perception of the role of human, into a transpersonal approach which has to be concern with the collective well-being. Education is the precondition for an increase of awareness of the damages imposed by human action to the ecosystems. The identification of sustainable solutions instead of overuse of the scarce resources of the planet needs cooperation and learning from the community as a whole (e.g. researchers, local governments, practitioners), sustaining the idea of co-creating a "participative reality" (Sterling, 2003, p.35). Part of our responsibility must be to inspire the next generation to become better than us and to reach higher than we have. Every project has a responsibility to educate and inspire: the next generation, the next project, the next innovation. In Restorative Practices in education, the whole school community, all school staff, pupils and sometimes parents, can be involved (Hopkins, 2004).

### BOTTOM-UP CHANGE

Bottom-up initiatives of citizens, communities and local governments should be seen as a part of the co-producing process in the regeneration of the life supporting systems of the planet. Bottom-up initiatives translates the ability to mobilize collaborative networks to change (Baker and Eckerberg, 2013). This approach seeks to not only involve those affected in the process of change, but also appreciate the proactive initiatives of people who "create the change that they want to see in the world" (Pulkkinen, 2014). This implies that a collective decision-making is in order to avoid the disturbance to Earth systems and further overuse of the resources. "This form of operation gives voice to different sectors and interests of the society, and creates a forum for public and private agendas that does not only respond to impositions or lack of action by the government, but promotes a proactive collaboration to foster restoration programs in different socio-ecological contexts" (Meli et al., 2017).

### PUBLIC PARTICIPATION

A partnership between local governments and communities in promoting awareness the earth's vulnerabilities and threats (Hegney et al. 2008) and the consequent need for restorative approaches, encouraging an increased 'responsibilization' by involving citizens and communities in the identification of subsequent responses (O'Malley, 2010).

### LOCAL & REGIONAL THINKING

Local and regional thinking towards regenerative sustainability captures the capacity building for mobilize local and regional actors for the use of internal qualities of localities and regions which require strong and cohesive local government structures and an entrepreneurial form of policy-making (Cole, 2006).

### AWARENESS

Awareness implies the need to make producers, communities and citizens understand development as an ecologically, socially, and economically sustainable outcome, not only for today, but also for the future generations of people, as well as for other forms of life now and in future. This requires the improvement of the knowledge by society of the harmful effects that human activity have on the health of ecological systems, in order to induce behavioral changes. To improve this awareness, a change in the public perception is needed for understanding of the quality and complexity of the ecological processes. Awareness requires education to which researchers, decision makers, and practitioners need to contribute by identifying the gaps and solutions associated with regenerative sustainability, and by communicating them to society in a way that changes perceptions and provokes action. Awareness also involves bringing economic activities that currently ignore or discount the value of natural capital to incorporate regenerative actions into the daily activities (Aronson et al., 2007). The awareness for the need of regenerative sustainability and its benefits calls for progressive ecological economics, not a reinforcement of neoclassical economics and business as usual (Alexander et al., 2016).

## ECOLITERACY

Ecoliteracy is defined as the ability to understand the natural systems that make life on earth possible (Norris, S. P., 2012). To be ecoliterate means understanding the principles of organization of ecological communities (i.e. ecosystems) and using those principles for creating sustainable human communities (Sealey, F., 2011). The term was coined by American educator David W. Orr and physicist Fritjof Capra in the 1990s thereby a new value entered education; the "well-being of the earth" (Surhone, L., 2011). An ecologically literate society would be a sustainable society which did not destroy the natural environment on which they depend (De Leo, J., 2010)

## EQUITY

Equity is an idea of fairness reflecting the human relationship with the distribution and access to earth's resources. This implies equal opportunities to reuse materials and reduce waste for everyone, regardless of the place where they live in the world. It also implies the change of perception of our place on the planet; seeing the living planet as a community, and not as a commodity. Regenerative sustainability based on fairness requires, on one hand, that citizens and business are socially and environmentally responsible and on the other, economically sustainable approaches (Robbins and Daniels, 2012). Equity implies a sharing of the capacity for well-being between present people and future people, generating a intergenerational fairness in allocating resources between competing interests at the present time (Solow, 1991).

## EGO – ECO – SEVA

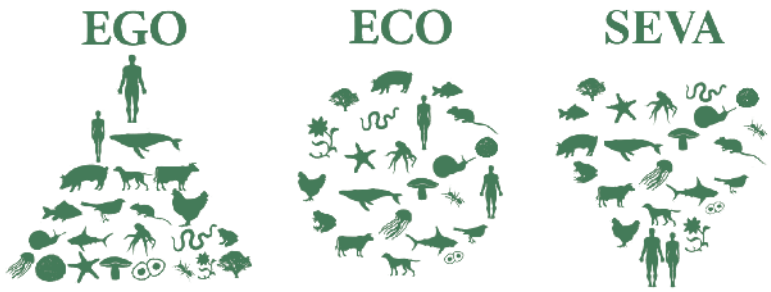


***Figure 2:*** *Visualization EGO – ECO – SEVA. © source: http://glancesideways.com*

The understanding of our position on the planet, which can be called a worldview, has a crucial role in building the awareness for regenerative sustainability. The role of humanity on earth should be repositioned from an ego-centered position to understanding that we are inherently a part of, and fully dependent on the web of life on the planet. To adopt this role, we also need to become aware of the need of regenerative sustainability. The above visualization EGO-ECO-SEVA illustrates three worldviews. EGO in the visualization (a development of a well-known EGO-ECO meme by Black, 2012), with man at the top, in a dominant position, ruling over all other life forms. This represents the current dominant worldview of the Western culture. The ECO represents a way of positioning ourselves as species together with all species, within the web of life. This worldview can be found in many indigenous cultures, and it is also firmly supported by research on ecology and evolution of life. SEVA, the third illustration, represents a regenerative worldview in which humanity embraces the living systems of the planet with love and care. Seva means service, and it translates into actions in which humanity adds more than it subtracts from living systems. In practice this means dedicating to heal the damage that has been caused by our previous action, which has risked the planetary resilience boundaries (Steffen et al., 2015). The progressive development from EGO to ECO to SEVA starts by moving away from EGO by realizing the that we are a part of the inherent connectedness and interdependencies of ecological systems, and continues to adopting SEVA as a necessary role for regenerative sustainability. This role is needed to create a culture that is not merely sustainable, but flourishes from being an interconnected part of the living systems of the planet. Adopting the role of SEVA enables the ECO way of living on the planet in the long term. This development of change of perception is in line with discussion by DuPlessis (2012): regenerative sustainability requires a shift of worldview, from mechanistic to ecological.

## REGENERATIVE CULTURES

Daniel C. Wahl (2017) suggests that we need to redesign our culture into a regenerative one. Regenerative culture creates new approaches conducive to supporting living systems of the planet, with diverse patterns and connections adapted to the unique biocultural conditions of each place. This approach stems from a tradition of practice and research. Inspired by the late John T. Lyle, (Lyle, 1994) these transformative innovators have demonstrated that buildings and communities can – by design – have a regenerative effect on place; Bill Reed co-founded the Regenesis Group and the Integrative Design Collaborative. William McDonough (McDonough and Braungar, 2012) launched the 'Cradle to Cradle' approach to industrial production, which is now at the heart of the transition to circular economies. Jason McLennan ( McLennan, 2004) has created the 'Living Building Challenge' and 'Living Futures Challenge' that have been taken up by built environment professionals around the world.

## LIVING CULTURE

Living culture, or intangible cultural heritage, refers to the practices, representations, expressions, knowledge and skills handed down from generation to generation. This heritage provides communities with a sense of identity and is continuously recreated in response to their environment.

## LOVE

Love is an intense feeling of deep affection (Oxford dictionary). Love for the earth implies to take care of earth and of the sustainability of its systems which implies a change of the society's lifestyle. The Earth is a living being who needs to be treated with love which requires effort, sacrifice or changing comfortable habits ( https://forloveoftheearth.com/).

## BIOPHILIA

"The biophilia hypothesis also called BET suggests that humans possess an innate tendency to seek connections with nature and other forms of life. Edward O. Wilson introduced and popularized the hypothesis in his book, Biophilia (1984). He defines biophilia as `the urge to affiliate with other forms of life`". (Biophilia hypothesis, https://en.wikipedia.org/wiki/Biophilia_hypothesis)

## WHOLE / LIVING SYSTEMS THINKING

According to Mang and Reed (2012), living systems thinking encompasses reciprocal relationships among smaller systems that comprise a larger system. Living systems thinking comprehends three phases. The first phase: Understanding and conceptualizing a right relationship to place conceptualizes regenerative development departing from the recognition that each place is a unique dynamic entity that defined its past and will determine its future. The second phase, called designing for harmony, seeks the pattern that harmonizes the relationship of people and landscape, creating a living local community. The third phase, co-evolution, requires the identification and use of the necessary material and human regenerative capacities to implement a project, in order to guarantee its sustainability.

## WELLBEING

Wellbeing for citizens is the result of individual, social and cultural variables and their interactions (Phillips, 2006) and is distinct from happiness because wellbeing entails an evaluation of how people think and feel about their lives as opposed to "instant" happiness.

## HEALTH

Human health is influenced by the living system connectivity which sustains the use of biophiliac approaches to improve perceived health and personal wellbeing. There are a growing evidence of the negative impacts from the ecosystem dysfunction on human health (Aronson et al., 2016). A health ecosystem is an ecological system that is free from 'distress syndrome' (Haskell et al., 1992; Ford et al., 2005).

## HAPPINESS

"Happiness that contributes to individual, community, and/or global well-being without exploiting other people, the environment, or future generations" (O'Brien, 2010) Happiness understood as the "path to the 'good life' instead of the 'goods life' (Kasser, 2006) as it is seen today in a consumer society where consumption and happiness are often treated as synonyms. Happiness is described as having a strong link with income (Layard, 2006) but Easterlin (2001) found similar levels of happiness in poor and rich countries. "Sustainable happiness underscores the interrelationship between human flourishing and ecological resilience. Thus sustainable happiness and well-being are integral to building sustainable futures, and positive psychology" (Tanasescu and Oprean, 2013, p. 170).

## MENTAL WELLBEING

The World Health Organization describes mental well-being as a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her (WHO, 2014)) There is no universally accepted "definition" of mental well-being. This is probably because mental well-being may have different connotations for different individuals, groups and cultures. For some, it may be the notion of happiness or contentment. For others it may be the absence of disease. For some it may be economic prosperity. It could be based on the goals sought to be achieved and the challenges placed on an individual or a culture. It also may mean the absence of negative determinants in the life of an individual or a community. Mental well-being includes cognitive, emotional and behavioral responses at a personal level. Some may also interpret mental well-being as determined by external stimulants and factors, sometimes beyond the control of individuals, such as housing and employment. Thus, mental well-being should be interpreted in the socio-cultural context of the individual (WHO, 2018). Mental wellbeing is a dynamic state that refers to individuals' ability to develop their potential, work productively and creatively, build strong and positive relationships with others and contribute to their community (Dewe, P., & Kompier, M., 2008).

## SUSTAINABLE WELLBEING

A balance between the need for growth - economic, employment, social, etc... – and needs to respect the present and future environment (Cesaretti et al., 2013). Sustainable wellbeing is also defined as "happiness that contributes to individual, community, and/or global well-being without exploiting other people, the environment, or future generations" (O'brien, C., 2008).

## REGENERATIVE DESIGN

"Regenerative design is an approach to shape and form a system that seeks to reverse environmental degradation by creating positive impacts, rather than merely causing less damage, to increase the health and wellbeing of humans, other living beings, and ecosystems as a co-evolutionary whole. Moreover, regenerative development is an approach for enabling human communities to co-evolve with natural living systems and building the field of caring for ongoing stewardship and self-renewing." (Akturk, 2016).

# INTRODUCTION

Regeneration of ecosystems has been mainly centered on ecological studies and the social role played by citizens and communities in regeneration processes has been almost neglected (Cabin 2007a,b; Halle, 2007). The damages caused on the planet by human activity have being increasingly acknowledged by society; however the path towards the general recognition that there is only one planet that humankind needs to love, care and preserve is yet to be built. Education is central for changing mindsets and for the development of human sustainable behaviors for the present and for the future. Sustainable development instead of growth at any cost has to drive the choices and actions of citizens, communities, business, scientists and governments.

Business-as-usual, or continuing the current way of life, leads to a decrease in collective well-being by the degradation of the earth's health. It is impossible to lead a healthy life within damaged ecosystems, and human activity as current, by overexploiting the earth's resources, generates serious negative effects on the planet, especially on the living systems. The future requires a regenerative approach in the sense that human activity has to add more than subtract from the planet. This future needs an increasing public participation and a wider discussion involving the stakeholders in the identification of problems and in the proposition of solutions. This would imply a deep knowledge of how ecosystems work and actions based on the notion that humans can and should co-evolve with natural living systems. The future begins to be built now and has to be cohesive, more fair and sustainable. For achieve this goal human actions have to embrace a different vision, one in which a sustainable well-being emerges from the human's love for the planet.

# VISION – "WELL-BEING AND LOVE FROM AWARENESS OF THE PLANET": FROM PIONEERS TO MAINSTREAM

Our vision "Well-being and love from awareness of the planet" stems from the awareness that health and well-being are only possible if they exist on all scales of the system, from individual humans to the living systems of the whole planet. Well-being and love from awareness of the planet is the healthy and fruitful interaction between the (eco) systems, without the dominance of any of the species (including humans), as indicated in the "Seva" representation. This will lead to a healthy environment which essentially means a renewed harmony among humans, ecosystems, and the built environment; the whole system that co-creates and co-evolves.

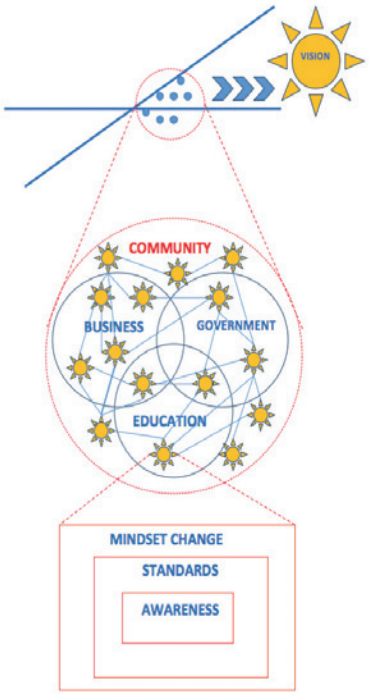


*Figure 3: Vision "WELL-BEING AND LOVE FROM AWARENESS OF THE PLANET", illustrative graphic, Faro 2017. © authors*

Our current dominant culture seems to be based on the misconception that the world is a resource that is created for humans to benefit from. We need to work towards healing the damaged ecosystems of the planet. While healing does not mean simply restoring a condition that once existed, the regenerative action should follow the fundamental systemic interactions in nature – enabling life to create conditions for itself to flourish. To achieve resilience in the living systems, it is crucial to increase diversity, connectivity, and cross-scale interaction.

Reaching this vision of well-being and love from awareness of the planet requires a fundamental shift in our mindsets. It is crucial to start working with the existing seeds of change, which can be found everywhere in our community. In our communication in the Restore meeting in Faro (2017) and beyond, we identified businesses, government and education as the three spheres from which we need to seek change agents. Also, the community outside these sectors, the so called fourth sector, hosts individuals and groups who work actively towards a regenerative future.

The action plan is to identify and connect these actors and their projects in all spheres from individuals and community groups, to businesses, government and education, and work towards connecting them and their work both as themes in research, and also in person. Each of the identified change agent should be empowered to influence their own field of action to change. The aim is to support growth of influential change agents, and connections between them.

The mindset change towards regenerative thinking enables different actors to create new standards for action in all levels, from personal and family level to communal interaction, and into businesses, government and education. While the action of change agents themselves is bottom-up action, the new standards they establish support the top-down direction of change. The movement towards a shift in worldviews can start with the awareness and the knowledge of the problems and the topics related to a more sustainable/regenerative living. Hence education on all levels of the system and dissemination of regenerative approaches, and the awareness towards their benefits, will have a triggering effect. The new standards further support increase of awareness, even among those who are not the pioneers in the field of regenerative sustainability.

To conclude, the vision of "Well-being and love from awareness of the planet" can be reached by starting with supporting the work of pioneers in the field; and these pioneers should be identified in all spheres of our current culture.

### EDUCATION AND AWARENESS

Education as a way of helping assure a more sustainable future, being transformative of the mindsets of citizens, communities and business towards the need of preserving and improving the living systems, not only as the resources of the planet, but also as the web of life that we are a part of. This implies a shift in the paradigm from “change in education” to “education for change” which emphasizes the role of education in the awareness of individuals, communities and society of the need of “loving the earth” as a way to preserve the planet for the present and future generations. Education should thus stem from the vision of a whole and living systems thinking (Reed, 2007). Education can be used as a transformative tool in shifting behaviors that are currently damaging the planet. This transformation generates dynamics towards decreasing waste in the daily life of citizens and business, and increasing reuse of the resources, thus building a collective culture of regenerative sustainability. Education for ecoliteracy acts as a precursor of public participation in providing solutions to concrete and local problems, favoring bottom-up approaches.

### HUMAN AND EQUITY

Humanity in love and in harmony with the earth, increasingly assuming a SEVA approach, in which human actions adds more than subtracts from the planet and heals the damage that has resulted in the Anthropocene. Regenerative sustainability should be seen as much more than a way to promote a fair and equitable access to the planet resources in the satisfaction of the human needs: regenerative way of living on the planet participates in the ongoing evolution and co-creation of living conditions. The concept of equity in regenerative sustainability extends the human species. We are a part of the web of life of the earth, and we should see this evolving systems as a community in which we are members. Earth is not a commodity of any single species, including the humankind; the web of life interacts in various ways that together create the conditions for continuous evolution.

### HEALTH AND WELLBEING

It is increasingly understood that human health is dependent on nature, and humans benefit from the connectivity with the living system, as healthy nature influences personal well-being. Biophilic approaches build on this notion. The interconnection between human health and the planet health can be used as a driving incentive for regenerative sustainability. This implies a deep knowledge and understanding of how the ecosystem health connects with the health and well-being of people. The health and mental well-being of the present and future generations are increasingly dependent on a healthy ecosystem, being the base for a sustainable well-being.
Planetary health refers to "the health of human civilization and the state of the natural systems on which it depends". (Rockfeller Foundation, 2017).

# GAP ANALYSIS

## EDUCATION AND AWARENESS

Regeneration has remained dominated by ecological studies lacking a broad approach that takes in consideration the social and human dimensions. Researchers and practitioners have been working on regeneration but using different languages and approaches which made it difficult to share a unified of knowledge. These knowledge needs to be past to society, increasing people's ecoliteracy and, consequently, their awareness of earth's damages and of the role they play in the co-evolution of the planet. An articulation between scientific community, local communities, practitioners and local governments is needed to improve collective awareness for the problems that require regenerative approaches and for the identification of suitable solutions. Cabin et al. (2010) identified that "education" is the most important factor limiting the practice of restoration which contribute for the absence of public awareness of and appreciation for regeneration which spreads to relevant industries and government agencies. As the Figure 3 evidences only involving the community, business and government are possible to promote the kind of education that improves the awareness for the need of regenerated ecosystems and contributes for mindset changes concerning the human-planet relationship.

## HUMAN AND EQUITY

The current access to the planet's resources is asymmetric and unfair (e.g. energy and water), creating many damages in the ecosystems and a social fabric that does not assure equal opportunities for everyone achieve a minimum standard of quality of life. This status-quo has to be changed in order to guarantee a sustainable social well-being. Restoration based on fairness requires from citizens and business behaviors that are socially and environmentally responsible. Equity implies a sharing of the capacity for well-being between current and future generations. Competing interests in society have to be balanced in the sense that the health of the planet needs to be privileged. The idea that restoring ecosystem compromises economic growth needs to be re-addressed as increasingly positive economic and employment impacts are identified from restoration investments (e.g. Shropshire and Wagner, 2009; Davis et al., 2011).

## HEALTH AND WELLBEING

"In the health sector there is as yet insufficient recognition that our health is intimately linked to the sustainability of ecosystems, wherein we live our lives" (van den Bosch and Depledge, 2015, p.6). "We must also continue to study and communicate the myriad ways in which healthy ecosystems benefit human health and well-being" (Aronson et al., 2016, p. 39). "From a social sciences perspective, there is a clear need for definition and valuation of the socioeconomic outcomes of ecological restoration projects. The numerous links between restoration, economic development, and societal well-being should be highlighted and made explicit wherever possible" (Aronson et al., 2010, p. 151).

| KEY TOPICS | VISION | STATE OF ART | GAP |
|---|---|---|---|
| PLACE | Earth as a community, not a commodity | Regenerative approaches departing from the recognition that each place is a unique dynamic entity. | To evolve towards a harmony between people and space in which the human activity generates zero net waste and uses renewal resources to assure a sustainable development for current and future generations. To restore the connection of people to nature and to the planet. |
| ENERGY | Local / Renewable ownership and management | Focus on renewable energy production, energy efficient construction, and green goods and services industries (green economy) and less on the role of energy for the ecosystem restoration. | To move from a green economy to a balanced economy this implies the preservation and restore of the planet's health. Energy as part of a coherent restoration approach aiming to increase the quality of the ecosystem contributing at the same time to a sustainable economic growth. |
| CARBON | Carbon working with natural systems | Strategies oriented to the remediation of the damage caused to the environment (e.g. revegetation). | Strategies oriented to the restoration of the damaged ecosystems, comprehending activities aiming the increase of carbon stocks and the reduction of the emissions of carbon dioxide, which would contribute for slowing the process of climate change. |
| WATER | Building and Cities to participate in Water Cycles. Local Watersheds | Buildings and sealed areas prevents the functioning of the water cycle. Approaches dealing with water as if the human owns it. | Innovative approaches in which cities incorporate natural cycles in the way they are built, function and grow. Develop urban concepts that mimic nature as a requirement for a balance and healthy life. Transform the human relationship with water, which implies the respect of its natural processes. |
| RESOURCES | Local, accessible and low-cost resources and building responsibility of managing the commons | Resources exist for human use. Management of resources based on an economic rationality: damages to the ecosystem can be compensated through a monetary payment. | Policies based on the idea that it is impossible to compensate damages; so damages have to be avoid. Resources are to be maintained for the future generations, which implies a responsible public management and an increasing participation of the society on the collective choices. |
| WELLBEING | Happiness that contributes to individual, community, and / or global well-being without exploiting other people, the environment, or future Generations | "Instant" happiness instigated by the consumer society that sustains the idea that more goods means higher individual and collective well-being, without considering the social and environmental impacts of their production and distribution. | Sustainable well-being as an opportunity to enhance quality of life and contribute to individual, community, and society well-being. Wellbeing from acknowledging that human are part of a living system and a damaged planet impacts negatively on the health of people and communities, today and for the future (a biophilic approach towards the well-being of the earth). The well-being of society as being interconnected to the achieved well-being of the planet. |
| EQUITY | All voices shall be heard. Equity beyond human community | Groups with economic power that exert lobby activities near governments guarantee for themselves economic and environmental advantages over the society without considering the depletion of the planet's resources. | To share the well-being between present people and future people, generating a intergenerational fairness in allocating resources between current competing interests. |
| EDUCATION | Bottom-up cultures / initiatives (permaculture, urban gardening, local currencies, urban pioneer movement, placemaking | Top-bottom approaches to deal with imbalances and damages in nature. | Bottom-up approaches which give voice to different sectors and interests of the society, and creates a forum for the promotion of a proactive collaboration to foster restoration actions, involving those affected in the process of change. Education for ecoliteracy as a precursor of public participation. |

# LITERATURE / REFERENCES


Akturk, A. (2016) Regenerative Design and Development for a Sustainable Future: Definitions and Tool Evaluation, Master Thesis, Faculty of University of Minnesota.

Alexander, S., Aronson, J., Whaley, O. and Lamb, D. (2016) The relationship between ecological restoration and the ecosystem services concept. Ecology and Society 21(1):34. http://dx.doi.org/10.5751/ES-08288-210134

Aronson, J. C., Blatt, C. M. and Aronson, T. B. (2016) Restoring ecosystem health to improve human health and well-being: physicians and restoration ecologists unite in a common cause, Ecology and Society 21(4), 39. https://doi.org/10.5751/ES-08974-210439

Aronson, J., Blignaut, J. N., Milton, S. J., Le Maitre, D., Esler, K. J., Limouzin, A., Fontaine, C., Wit, M. P., Mugido, W., Prinsloo, P., van der Elst, L., Lederer, N. (2010) Are Socioeconomic Benefits of Restoration Adequately Quantified? A Meta-analysis of Recent Papers (2000–2008) in Restoration Ecology and 12Other Scientific Journals, Restoration Ecology, 18(2), 143–154.

Aronson, J., Milton, S. J. and Blignaut, J.N. (2007) Restoring natural capital: science, business, and practice, J. Aronson, S. J. Milton, and J. Blignaut (eds). Island Press, Washington, D.C., USA.

Baker, S., and Eckerberg, K. (2013). A policy analysis perspective on ecological restoration, Ecology and Society, 18(2), 17.

Black (2012): Progression and conceptual development. Blog post / Glance Sideways, 5.10.2012. http://glancesideways.com/2012/10/progression-and-conceptual-adjustment/

Brown, M. (2016) FutuREstorative: Working Towards a New Sustainability. RIBA Publishing.

Cabin, R. J. (2007a) Science-driven restoration: a square grid on a round earth?, Restoration Ecology, 15, 1–7.

Cabin, R. J. (2007b) Science and restoration under a big, demon haunted tent: reply to Giardina et al., Restoration Ecology, 15, 377–381.

Cabin, R.J., Clewell, A., Ingram, M., McDonald, T. and Temperton, V. (2010) Bridging Restoration Science and Practice: Results and Analysis of a Survey from the 2009 Society for Ecological Restoration International Meeting, Restoration Ecology, 18(6), 783–788.

Cesaretti G. P., Viola I., Misso R. and Borrelli I. P. (2013) "Green society – A conceptual framework of sustainability from a territorial perspective", in Quality - Access to Success, Settembre, Supplement, Vol. 14, p. 50.

Cole, A. M. (2006) Decentralization in France: Central Steering, Capacity Building and Identity Construction, French Politics, 4(1), 31-57.

Davis, E.J., Sundstrom, S., Moseley, C. (2011) The economic impacts of Oregon's South Coast restoration industry. Working Paper No. 34, Ecosystem Work-force Program, University of Oregon, Eugene, Oregon. http://ewp.uoregon.edu/publications/working.

De Leo, J. (2010) Reorienting Teacher Education to Address Sustainable Development: Guidelines and Tools: Education for Intercultural Understanding. UNESCO Asia and Pacific Regional Bureau for Education.

Dewe, P., & Kompier, M. (2008) Foresight mental capital and wellbeing project. Wellbeing and work: Future challenges. London: The Government Office for Science, 66, 1-31.

Du Plessis, C. (2012) Towards a regenerative paradigm for the built environment. Building Research & Information, 40(1), 7-22.

Easterlin, R. A. (2001) Income and happiness: Towards a unified theory. The economic journal, 111(473), 465-484.

Ford, A. E. S., Graham, H. and White, P. C. L. (2015) Integrating human and ecosystem health through ecosystem services frameworks, EcoHealth, 12, 660-671.

Halle, S. (2007) Present state and future perceptions of restoration ecology–introduction, Restoration Ecology, 15, 304–306.

Haskell, B. D., Norton, B. G. and Costanza, R. (1992) Introduction: What is ecosystem health and why should we worry about it?, in: R. Costanza, B. G. Norton, and B. D. Haskell (eds), Ecosystem health: new goals for environmental management (pp. 3-20). Island Press, Washington, D.C., USA.

Hegney, D., Ross, H., Baker P., Rogers-Clark, C., King, C., Buikstra, E., Watson-Luke, A., McLachlan, K, and Stallard, L. (2008) Building resilience in rural communities: A Toolkit. Queensland: The University of Queensland.

Hopkins, B. 2004. Just schools: A whole school approach to restorative justice. London: Jessica Kingsley

Kasser, T. (2006) Materialism and its alternatives, in: M. Csikszentmihalyi, and I. Csikszentmihalyi (Eds.), A life worth living: Contributions to positive psychology (pp. 200-214). Toronto: Oxford University Press.

Layard, R. (2006) Happiness and public policy: a challenge to the profession, The Economic Journal, 116 (510), C24–C33.

Mang P & Reed B (2012) Regenerative Development and Design. Regenesis Group and Story of Place Institute Chapter 303, Encyclopedia Sustainability Science & Technology,

Mang, P. and Reed, B. (2012) Designing from place: a regenerative framework and methodology, Building Research & Information, 40(1), 23-38.

McDaid, D., & Cooper, C. L. (Eds.). (2014) Wellbeing: A Complete Reference Guide, Economics of Wellbeing (Vol. 5). John Wiley & Sons. (Contribution: Blerta, SG Social)

McDonough, W., & Braungart, M. (2010) Cradle to cradle: Remaking the way we make things. North point press.

McLennan, J. F. (2004) The philosophy of sustainable design: The future of architecture. Ecotone publishing.

Meli, P., Herrera, F. F., Melo, F., Pinto, S., Aguirre, N., Musálem, K., Minaverry, C., Ramírez, W., Brancalion, P. H. S. (2017) Four approaches to guide ecological restoration in Latin America, Restoration Ecology, 25(2), 156–163.

Norris, S. P. (Ed.). (2012) Reading for evidence and interpreting visualizations in mathematics and science education. Springer Science & Business Media.

O'Brien, C. (2008) Sustainable happiness: How happiness studies can contribute to a more sustainable future. Canadian Psychology/Psychologie canadienne, 49(4), 289.

O'Brien, C. (2010) Sustainability, happiness and education, Journal of Sustainability Education, http://www.jsedimensions.org/wordpress/content/2010/04/

O'Brien, C. (2012) Sustainable happiness and well-being: Future directions for positive psychology. Psychology, 3(12), 1196.

O'Malley, P. (2010) Resilient subjects: Uncertainty, warfare and liberalism, Economy and Society 39, 488–508.

Phillips, D. (2006) Quality of life: Concept, policy and practice. UK: Routledge.

Planetary health discussion: https://en.wikipedia.org/wiki/Planetary_health

Pulkkinen, K. L. (2014). A bottom-up way of building a system and changing perceptions–urban pioneers as a model for transformation for sustainability. Systema: connecting matter, life, culture and technology, 2(2), 71-80.

Reed, B. (2007) Shifting from 'sustainability' to regeneration, Building Research & Information, 35:6, 674-680.

Robbins, A. S. T., Daniels, J. M. (2012) Restoration and Economics: A Union Waiting to Happen?, Restoration Ecology, 20(1), 10-17.

Rockfeller Foundation (2017) Conversation on Planetary Health. [online]. Planetary Health Landscape. Available at: https://assets.rockefellerfoundation.org/app/uploads/20170919100500/The-Planetary-Health-Landscape-From-Concept-to-Action.pdf.(Accessed on 11th of April 2018).

Sealey, F. (2011) Global Public Square. Chipmunkapublishing Ltd.

Shropshire. R., Wagner, B. (2009) An estimation of the economic impacts of restoration in Montana. Research and Analysis Bureau, Montana Department of Labor and Industry, Helena. http://www.ourfactsyourfuture.org/media/9321/restoration.pdf.

Solow, R. (1991). Sustainability: An economist's perspective. The Eighteenth J. Seward Johnson Lecture. Woods Hole, MA: Woods Hole Oceanographic Institution.

Steffen, W., Richardson, K., Rockström, J., Cornell, S. E., Fetzer, I., Bennett, E. M., ... & Folke, C. (2015). Planetary boundaries: Guiding human development on a changing planet. Science, 347(6223), 1259855.

Sterling, S. (2003) Whole systems thinking as a basis for paradigm change in education: explorations in the context of sustainability. PhD thesis, University of Bath, Bath.

Surhone, L. (2011) Ecological Literacy. Betascript Publication.

Tanasescu, C. R., Oprean, C. (2013) Towards a sustainable well-being, Review of Applied Socio- Economic Research, 5(1), 170-178.

van den Bosch, M. A., Depledge, M.H. (2015) Healthy people with nature in mind, BMC Public Health, 15, 1232. DOI 10.1186/s12889-015-2574-8.

Wahl, D.C. (2016). Designing Regenerative Cultures. Triarchy Press, Axminster: England.

WHO (2014) Mental health: a state of well-being. [online]. WHO. Available at: http://www.who.int/features/factfiles/mental_health/en/. (Accessed on 11th of April 2018).

WHO (2018) "Defining" mental well-being. [online]. Promotion of mental well-being. Available at: http://www.searo.who.int/entity/mental_health/promotion-of-mental-well-being/en/ . (Accessed on 11th of April 2018).

# PRACTICE REVIEW

NAME: Architectural and artistic design of “Gotse Delchev” Street and of “24 MAY” Square

LOCATION: Bansko, BULGARIA

LIENT / OWNER: Bansko Municipality

ARCHITECT: Ivailo Mizov

CONTRACTOR: DZZD

THEME/TYPOGRAPHY: SOCIAL, HERITAGE – Public, infrastructure

COMPLETION YEAR: 2016

BUILDING: At the centre of the development, as the compositional axis, is an existing water course. Around it, the main pedestrian and combined movement pathways are developed. They are separated by linear green areas linking individual levels. The com-positional solution is reminiscent of the smooth movement of the ski slopes, supporting natural stone moraines

The street has become a place where residents and guests have opportunity to spend leisure time for sports, social contacts, games and cultural events related to heritage and cultural crafts in Bansko.

The main concept of the proposal is the development of a pedestrian zone ‘The Street of Craft’. There are 22 craft pavilions along a wavy pathway with some 40 seating benches alongside the waterfall. Seven modular bridges provide passage over the water course. In light of the significant difference in topographic profile, the notion of moraine is preserved, providing a pleasing element with the linear natural landscape.

WEBSITE: http://bansko.bg/

PHOTOS: “Gotse Delchev” Street and Square "24 MAY", Bansko, Before and After. (Photos by Bansko municipality)

*Before*

*After*

REGENERATIVE SUSTAINABILITY

Rainwater management through green infrastructure has become an alternative sustainable approach in many urban communities. Such projects as this one achieve ecological and economic benefits by demonstrating the value of the green over the grey.

**Energy:** Using of modern technologies and local renewable energy sources.

**Carbon:** Natural vegetation will help to reduce CO2 emissions and to improve air quality.

**Water:** The running water is designed to resonate with ‘valyavitsa’, the washing clothes near running water.

**Resources/Material:** Use of natural materials characteristic of the city with textured natural pebbles at crossroads.

**Wellbeing:** this is an accessible environment and healthy urban development, designed as disabled and bike friendly, avoiding saturation of cars found elsewhere in this city.

# 04 LIVING BUILDINGS

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*Figure 4: LIVING BUILDINGS: RESTORE Vision towards a regenerative Future. Main idea, scale, key topics and related concepts. © authors*

# KEY DEFINITIONS

## BUILDING

### GREEN BUILDING:

"Green buildings are designed to reduce the overall impact of the built environment on human health and the natural environment by:

- Efficiently using energy, water, and other resources
- Protecting occupant health and improving employee productivity
- Reducing waste, pollution and environmental degradation" (EPA, 2016)

### RESTORATIVE NEW BUILDING:

RESTORATIVE sustainability aims to restore social and ecological systems **to a healthy state.** In the context of new buildings, a restorative building pursues reversing damage that has been caused to a particular site, it has the ability to restore health and wellbeing by its impact on the environment, health, quality of life and productivity of its inhabitants.

It combines sustainable building practices with building practices that benefit occupant health, reinforces the human connection with nature, applies biophilic design for the inhabitants with green building methods:

- improves the physical and mental health and wellbeing of people,
- promotes the natural environment,
- enables flexible design and adaptivity, furthermore provides holistic comfort,
- favours carbon-free technologies and the utilization of renewable energy sources, aided by ICT-technologies,
- creates environmental, social and economic added value and generates positive impact.

### REGENERATIVE NEW BUILDING:

A regenerative building and the regenerative design process not only restores but also improves the surrounding natural environment by enhancing the quality of life for biotic (living) and abiotic (chemical) components of the environment. The regenerative design process promotes the pattern of relationships between the physical, built, and natural environment. In the regenerative building design process, the same principles are followed as for restorative buildings, but include all aspects of systems thinking from site, water, materials, and energy to plants, microbes, human social systems, and culture.

### CARBON

Carbon is seen by nature as a positive building block, not the enemy (McDonough, 2016).

**A New Language of Carbon**

'Low carbon', 'zero carbon', 'decarbonisation', 'negative carbon', 'neutral carbon', even 'a war on carbon' – all are part of the discourse. If we can reduce our carbon emissions, and shrink our carbon footprint, the thinking goes, we can bring down the carbon enemy. It's no wonder that businesses, institutions and policymakers struggle to respond.

But carbon – the element – is not the enemy. Climate change is the result of breakdowns in the carbon cycle caused by us: it is a design failure. Anthropogenic greenhouse gases in the atmosphere make airborne carbon a material in the wrong place, at the wrong dose and for the wrong duration. It is we who have made carbon toxic – like lead in our drinking water or nitrates in our rivers. In the right place, carbon is a resource and a tool.

A new language of carbon recognizes the material and quality of carbon so that we can imagine and implement new ways forward (see 'The new language of carbon'). It identifies three categories of carbon – living, durable and fugitive – and a characteristic of a subset of the three, called working carbon. It also identifies three strategies related to carbon management and climate change – carbon positive, carbon neutral and carbon negative. (McDonough, 2016)

**Carbon dioxide –** A greenhouse gas produced through respiration and the decomposition of organic substances. Combustion of fossil fuels is primarily responsible for increased atmospheric concentrations of this gas. Carbon dioxide is just one of the six main greenhouse gases limited by the Kyoto protocol. For simplicity of reporting, the mass of each gas emitted is commonly translated into a carbon dioxide equivalent so that the total impact can be summed to one figure and expressed as a carbon footprint. The total amount of Carbon Dioxide produced by human activities, usually expressed in tons of carbon dioxide (CO2). The total amount of greenhouse gases produced from directly and indirectly enabling, usually expressed in tons of carbon dioxide (CO2e). (GSTC, n.d.; Brown, 2008)

**Carbon footprint –** The total set of greenhouse gas emissions caused directly and indirectly by an individual, organisation, event, product, or a building. ISO 16745, Sustainability in buildings and civil engineering works – Carbon metric of an existing building during use stage provides guidance to calculate, report and verify the operational carbon footprint of a building.

**Carbon neutral –** Achieving net zero carbon emissions by balancing carbon released with an equivalent amount saved or sequestered. Making or resulting in no net release of carbon dioxide into the atmosphere, especially as a result of carbon offsetting. By the increasingly widespread net zero buildings, net zero refers to carbon neutrality. They often refer to them as a zero-emission buildings (ZEB).

## DESIGN

**Design for Disassembly / Design for DeConstruction** – 10 principles:

1. Document materials and methods for deconstruction.
2. Select materials using the precautionary principle.
3. Design connections that are accessible.
4. Minimize or eliminate chemical connections.
5. Use bolted, screwed and nailed connections.
6. Separate mechanical, electrical and plumbing (MEP) systems.
7. Design to the worker and labor of separation.
8. Simplicity of structure and form.
9. Interchangeability.
10. Safe deconstruction.

(Guy & Ciarimboli, 2005; Brown, 2016)

**Regenerative Design –** applies to community planning and building design. Regenerative design, as used here, relates to approaches that support the co-evolution of human and natural systems in a partnered relationship. It is not the building that is 'regenerated' in the same sense as the self-healing and self-organizing attributes of a living system, but by the ways that the act of building can be a catalyst for positive change within the unique 'place' in which it is situated. Within regenerative development, built projects, stakeholder processes and inhabitation are collectively focused on enhancing life in all its manifestations – human, other species, ecological systems – through an enduring responsibility of stewardship. (Cole, 2012; du Plessis, 2012; Mang & Reed, 2012)

**Restorative Design –** starts with place-based design. By engaging all the key stakeholders and processes of the place – humans, earth systems, and the consciousness that connects and energizes them – the design process builds the capability of the people to engage in continuous and healthy relationship. There is continuous learning and feedback so that all aspects of the system are an integral part of the process of life in that place – co-evolution. (Reed, n.d.)

## ENERGY

**Renewable energy –** Renewable energies are energy sources that are continually replenished by nature and derived directly from the sun (such as thermal, photo-chemical, and photo-electric), indirectly from the sun (such as wind, hydropower, and photosynthetic energy stored in biomass), or from other natural movements and mechanisms of the environment (such as geothermal and tidal energy). Renewable energy does not include energy resources derived from fossil fuels, waste products from fossil sources, or waste products from inorganic sources. (Ellabban, Abu-Rub, Blaabjerg, 2014)

**Restorative and regenerative energy –** Perhaps the best definition and understanding of how Energy provision and use can be restorative and regenerative is encapsulated in the Living Building Challenge's Energy Petal Intent.

The intent of the Energy Petal is to signal a new age of design, wherein the built environment relies solely on renewable forms of energy and operates year-round in a safe, pollution-free manner. In addition, it aims to prioritize reductions and optimization before technological solutions are applied to eliminate wasteful spending – of energy, resources, and dollars. The majority of energy generated today is from highly polluting and often politically destabilizing sources including coal, gas, oil, and nuclear power. Large-scale hydro, while inherently cleaner, results in widespread damage to ecosystems. Burning wood, trash, or pellets releases particulates and carbon dioxide (CO2) into the atmosphere and often strains local supplies of sustainably harvested biomass while robbing the soil of much-needed nutrient recycling. The effects of these energy sources on regional and planetary health are becoming increasingly evident through climate change, the most worrisome major global trend attributed to human activity. (International Living Future Institute, 2018)

## STANDARDS

The various green building standards include the most important criteria for sustainable design and construction. They were established to set benchmarks and to provide a transparent system for designers, builders and operators. These rating systems encourage commitment to sustainability in the building sector and building operations. While well-known rating systems such as LEED and BREEAM are concerned with the environmental impacts of buildings, emerging building standards (WELL, LBC) focus on the buildings' effects on human health and well-being.

## WATER

Due to climate change and other human activities, water – particularly drinking water – quality and quantity is becoming increasingly scarce. According to the United Nations Environmental Program's study, over an entire life-cycle, the construction industry consumes a global average of 30% of fresh water (UNEP, 2006). The water footprint of buildings has different sources:

- human and household water consumption (eg. showering, washing machines, cleaning)
- building operation, HVAC systems (e.g. circulated water for heating and cooling)
- water consumption during the construction
- production of building materials

**Net-positive water –** When a building is net positive in relation to water, it means that it is creating more water than it actually uses. There are three key ways to become net-positive. (Veolia, 2016.)

- Optimizing consumption: reducing water use, with water monitoring, water efficient appliances and limiting the own usage,
- recycling water: recycling and/or purifying used project water on-site,
- capturing and recapturing water: rainwater harvesting or other natural closed-loop water systems.

# INTRODUCTION

The rapid urbanization resulting from the accelerated industrial development and population growth contributed to the development of buildings that interact little with their environment or occupants. The main focus of establishing buildings used to be on fulfilling certain needs, such as aesthetics, function, adequate comfort, and financial aspects, but it was minimally considered whether they fit well with the natural environment. The design and construction were defined by the uses and circumstances of the given time, therefore usually remodelling or replacement is required when needs or conditions change, which is a both financially and environmentally expensive approach. (Nugent et al. 2016).

The recognition of climate change resulted a paradigm shift to sustainable design in the building industry, with the aim to reduce the building stock's contribution to global CO2-emissions and avoid the depletion of resources. The concepts of energy efficiency, utilization of renewable energy sources and the promotion of building users' comfort, health and wellbeing were introduced, among others. However, according to the World Economic Forum's Global risks report (2016), "climate change-related risks have moved from hypothetical to certain because insufficient action has been undertaken to address them." Therefore, to be able to achieve the targeted CO2-level reductions, sustainable building practices, that have lower focus on how buildings interact with their natural surrounding or help to restore damaged ecosystem services, should be exceeded by new approaches. Such as the concepts of adaptive, restorative and regenerative buildings, which are different in their innovative strategies and technologies, aiming to reconnect with nature, restore the natural environment and achieve truly sustainable outcomes.

Moreover, buildings serve as the context to people's everyday life, providing a place for living, working and spending leisure time, among others. According to statistics, in general, people spend around 70-90% of their lifetime in buildings. As a consequence, buildings have a significant impact on human life-quality. (Faragó, Láng, & Csete, 2010) Therefore, architecture should create liveable spaces which provide not only an enclosed, functional place with comfort, but also healthy environment and a re-connection to nature.

# VISION – WHERE WE WANT TO GO!

## NET-POSITIVE IMPACT, SYSTEMS THINKING, RESTORATIVE BUILDING, REGENERATIVE BUILDING

**Restorative and regenerative buildings to generate positive impact – doing "more good" – to the environment and enhance human life quality.**

Regenerative and restorative buildings go beyond living building (autonomous or net-zero) levels by also improving the surrounding environment such as restoring a site's natural hydrology or providing for lost wildlife and plant habitat. These buildings are integrated into the natural environment and designed to improve damaged surrounding environments. Regenerative and restorative buildings not only produce all of their own energy, capture and treat all water, but they are also designed and operated to have a net-positive impact on the environment, including repairing surrounding ecosystems.
Examples of how a building can help restore the environment:

- Being more aware of its physical, social, economic, planning design, long range existing neighbourhoods in relation to the place development.
- Utilizing carbon-free technologies.
- Producing more energy, than the building consumes and sharing the excess so other buildings can meet their energy demands. In order to share excess energy produced from on-site power generation with surrounding buildings, the building would need to be connected to the grid.
- Creating opportunities for urban agriculture such as growing food on a green roof, and local animal farming such as raising fish in aquaponics.
- Recharging groundwater systems.
- Creating ecosystems for local species whose niches had been missing, damaged, or destroyed.
- Utilizing local materials and resources, promoting a closed material cycle.
- Recycling waste, especially promoting biological waste usage for environmental nourishment.

During the concept development, the team came to question, whether restorative and regenerative buildings mean different building types, or the difference rather lays in the level of their contribution to regenerating the natural environment or reflects their actually held stage in the process from reducing impacts through restoration to regeneration.  In this context, the fine distinction is that restorative design is reversing damage that has been caused to a particular site by either nature or humans, while regenerative design is creating even better conditions to support the life-enhancing qualities of ecosystems. As already mentioned in the definitions section, all aspects of systems thinking are included in the regenerative building design process.

As a remark, research institutions have to be in front of future research about new materials, new insights. Science is changing all the time in many fields that impact different populations. We need to encourage even laymen to advice experts from their own experiences what are the bad and what are the excellent things that influence their quality of life in urban realms.

# STATE OF THE ART

The built environment accounts for 36% of EU CO2 emissions and 40% of total EU energy (European Commission, 2018). By recognizing this, serious progress has been made to reduce negative impacts, many sustainable building standards were created (e.g. LEED, BREEAM). However, they are not yet able to neutralize or reverse all the negative effects and could not become truly restorative or regenerative. The state of the art new building development focuses on the design, construction and education practices, which are considered sustainable.

Some design practices and sustainable principles can be considered as already pointing towards restorative design approach to some extent, however, there are differences in the maturity levels of the diverse subtopics. Current sustainable principles largely focus on energy reduction during the building's operation, and be less aware of, among other things, the negative impacts of construction practices, material production and the built environment's effects on human health and well-being.

The following key topics were analysed related to new buildings: **Place, Energy, Carbon, Water, Resources, Wellbeing, Equity, Education, Scientific research innovation.**


*Figure 5: Living buildings, brainstorming outcomes in Faro, 2017. © authors*

**Place –** the current design approach of optimizing building footprint and mass ratio. Thinking is focused more on places being able for the public, involvement of people, providing connectivity – not only regarding public transport, but also providing social connectivity via internet, wi-fi connection – as a new layer of function to build resilient communities.

An important aspect of the project site selection is whether it is a green, grey or brownfield development. Grey- and brownfield developments are urged. Both refer to previously developed sites; while brownfield development means former industrial, military and transport areas, greyfield development is the site of former residential or other economic and infrastructural areas (e.g. dead malls). (Orosz, 2012). Greenfield investments shall be avoided to preserve sensitive ecological habitats.

Other key aspects of the site selection are the availability and distance of services (shopping, restaurants, schools, etc.), public transportation network and bicycle infrastructure.

Little attention is paid to the restoration of nature, establishing green areas around new buildings is limited by large sealed surfaces.

**Energy –** building energy systems are highly efficient, utilizing renewable energies, like solar or wind energy to some extent. As a result of the increasingly stringent building regulations, the thermal insulations are getting thicker, thus saving considerable energy. For new buildings, the preparation of energy certificate is mandatory almost everywhere in Europe. Due to the extensive spread of the passive house movement, many passive houses have been built, mainly in Germany and Austria. Examples of nearly-zero-energy buildings and active buildings are also already realized, mostly in more advanced, Western-European countries (ZEBRA2020 Data tool, 2017).

**Carbon (greenhouse gases in overall) emissions –** the current approach is to reduce CO2 emissions; however, thinking should be shifted to producing more oxygen than the emitted CO2 amounts. Also, current practices resulting enhanced CO2 emissions should be changed. The emissions of the building sector are produced by fossil fuels consumption related to buildings operations, and consumption related to building materials manufacture and transport. By 2050, the EU aims to cut its emissions substantially – by 80-95% compared to 1990 levels as part of the efforts required by developed countries as a group (European Commission, 2017)

**Water –** it is getting considered more significantly in design, both in building and urban scale, as a tool to reduce future water scarcity. Water capture and cleaning, and reuse to some extent is already current practice, but it is still rather focused on reducing consumption and negative impacts.

Storm water management: due to climate change, more frequently extreme weather conditions cause the traditional urban sewer system to fail. Concentrated drainage of rainwater usually overburdens the sewer networks. In the urban environments due to the usually not water-permeable surfaces, the risk of flooding increases. Sustainable Urban Drainage Systems (SUDS) are collecting and managing surface water within urban areas. Green roof soakaways, swales, infiltration trenches, ponds and wetlands are part of the SUDS (Brown, 2016).

Greywater utilization has become widespread. Sources of greywater include sinks, showers, baths, washing machines or dishwashers. Grey water can be used on-site for toilet flushing, landscape or crop irrigation, and other non-potable uses.

**Resources –** due to green building certification systems (e.g. see LEED, BREEAM), it is more consciously considered what kind of materials are used in a building and what effect they have on the human health (i.e. adverse impacts) – this approach already points towards restorative thinking. However, The Domestic Chemical Cocktail paper by Gaia Group (2008) points out, that of the 55,000 materials available to the building industry, only 3% have been tested for their toxicity on humans. Particular attention has already been given to limits for VOC (Volatile Organic Compound) levels in building materials and furniture. In recent certification systems such as WELL or LBC, there are more stringent requirements: a 'Red list' collects all the materials that are unsafe, and the project cannot contain (e.g. PVC, added formaldehyde, mercury, added lead).

Life Cycle Analysis (LCA): The environmental impact of a building goes beyond the operation and construction phases. During the assessment of the whole life cycle, consideration must be given to the mining, production, transportation, installation, amortization, maintenance, replacement and demolition of building structures and other products and their environmental impacts. Recyclable, recycled local materials and construction products should be preferred. The assessment converts the output into carbon dioxide equivalents (CO2e). The use of Life Cycle Analysis is increasingly spreading. In doubtful situations, it is recommended to choose a material with a smaller ecological footprint. Another way to reduce embedded carbon is to reuse and recycle building structures and materials. However, this has not yet spread widely. The appearance of third party material certifications (e.g. Declare) points towards restorative and regenerative principles. These standards certify sustainable resource extraction and fair labour practices. For timber, the Forest Stewardship Council (FSC) label is widely used and required.

The traditional and natural building materials have been rediscovered. Local thatch and reeds can be used for wall cladding and roofing. The use of straw bale for architectural purposes is becoming widespread, due to its many beneficial properties. Straw bales have good acoustic and thermal characteristics, and they provide healthy indoor air quality. Thanks to its load-bearing ability, wall structures can be made without a wooden frame.

**Social aspects – wellbeing, equity and education,** detailed below, are already reflecting the restorative thinking in the sense of focusing more on human aspects during the design. Due to its significant weight in the restorative agenda, a new field of social restorative aspects should be recommended as part of higher studies and university levels.

**Wellbeing** is already a key aspect of current design guidelines, standards or building certification systems (e.g. LEED v4, BREEAM, WELL Building Standard, LBC), promoting active living, posing requirements on indoor and outdoor air quality, natural light, quality view, noise attenuation etc. However, measures applied in building design for providing natural light, fresh air, and temperature/humidity comfort are still rather focused on reducing the energy consumption of buildings. The number of researches on the effects of building design and materials on human health, psychology, and productivity started to increase.

**Equity –** support of vulnerable and poor people is getting more and more into focus – e.g. providing social housing built by passive house standards results lower utilization costs in Austria (practical examples can be found in Vienna for instance). This way these people have a better chance to get more involved into the society and reach a higher standard of living. Also, more attention is paid to other vulnerable groups, e.g. children, elderly people, or people with special needs, during design (e.g. BREEAM requirements). Duties and rights, accessibility are already core requirements in many European countries.

**Education –** also started to include the above aspects into their programs – e.g. kindergartens, schools teach sustainable thinking to children, e.g. using less water, waste selection, etc. Appearance of citizen science: population participation in research or data collection, creating added value and positive impact. It is necessary to know how people perceive the climate change impacts (if any) and how they want and can adapt on the households (community) level.

**Role of new technology:** it interrelates to all of the above topics to some extent, data collection and big data have recently become part of the design – it could help to understand the difference between merely reducing impacts (“doing less bad”) and generating a positive impact (“doing more good”), and identify the next steps to achieve restorative design.

Building Information Modelling (BIM) is getting wide-spread in building design. It is a digital representation of physical and functional characteristics of a facility. A BIM is a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life-cycle; defined as existing from earliest conception to demolition.” (NIBS, 2015)

# GAP ANALYSIS – WHAT WE NEED!

**In order to see how to get from the state of the art new buildings as described in the previous chapter to the vision of regenerative buildings, a gap analysis was conducted.**

**To realize regenerative new buildings, a shift in thinking about the followings should be made:**

- Development and application of new design methods and systems thinking in design.
- Data collection, big data should be more utilized for informing building design.
- Focus of design thinking should be shifted to human and social aspects, i.e. improving human health and wellbeing of building occupants.
- Perception of a building's relationship with its surroundings.
- Role of a building as an active element of the natural ecosystem and its reconnecting function with nature.
- Development and utilization of new, carbon-free technologies.
- Future water scarcity mitigation by net positive water management approach.
- Promoting circular economy.
- Increasing promotion of equity and educating people.

**Design:** New design methods and approaches should be developed and applied that promote nature, human health and wellbeing, based on systems thinking and oriented towards contributing to positive outcomes (for instance bio-climatic design, biophilic design, topophilic design, salutogenesis, biomimicry, isotopic design etc.).

Design thinking should be shifted to a stronger focus on human and social aspects, i.e. improving human health and wellbeing of building occupants, to promote longer life expectation. Regenerative buildings should be not only less harmful for human health, but improving health, contributing to the occupants' healthy life by providing adequate view, fresh air, natural light, comfortable temperature/humidity, psychological environment etc, furthermore reconnect people with natural environment. New functions or services (which are unknown yet) might be needed to be provided by buildings in the future (e.g. functionality shift earlier: elderly homes providing merely healthcare vs. providing opportunities for elderly people to get together, do something creative, have social life etc.).

**Role of data:** it interrelates to all aspects of building design to some extent – data collection and big data started to become part of the design, however it is still in the development phase. Data collection and analysis could help to better understand the difference between merely reducing impacts ("doing less bad") and generating a positive impact ("doing more good") and identify the next steps to achieve restorative design. Data-collection can inform and optimize building operation, furthermore inform future decisions on how to modify, or further develop the built environment and related technologies.

**Place:** Restoring a healthy interrelationship with the natural environment, thinking about where we must build, how we should restore a place where we have built is highly significant in the case of restorative and regenerative new buildings, when choosing location.

- Strategic decisions on location and layout of a building can significantly reduce risks associated with climate change such as higher temperatures and water resource shortages. Designing buildings for climate change contributes to zero impact due to the building's ability to adapt to changes in climate without having to redesign, and in some cases, rebuild.
- Local agriculture and food production at the place should be promoted, as expanding built environment is taking up arable land, thus contributes to the problem of global famine.
- Outdoor space should provide healthy environment and opportunities for people for recreation and relaxation, that contributes to social, psychological, and physical wellbeing.

**Energy:** Overall energy consumption of the building should be minimized in order to reduce CO2 emission at the primary sources. New technologies should be researched and developed, which might allow more effective utilization and storage of local renewable energy sources, as well as sharing the excess heat/cold/electricity to fulfil the needs of all neighbouring buildings, in addition restore air quality. Buildings should act as elements of an energy-distribution network; smart energy systems that analyse energy usage and needs of the neighbouring buildings need to be realized in order to optimize energy-use (e.g. sharing economy). Carbon free technologies would be needed to avoid carbon emissions, and CO2 emission reduction should be replaced by oxygen generation, thus it would result added oxygen production with zero CO2 emission (e.g. urban algae canopy produces oxygen (Kohlstedt, 2015)).

**Water:** Predicted increase of water scarcity should be mitigated by net positive water management (Ma, 2013). Potable and quality water should be supplied in any country. Captured precipitation water, re-cycling and purified grey and black water are some on-site solution possibilities. However, due to the predicted climate change impacts, that is expected to result warmer climate in the future, rainwater harvesting might become not enough in many regions, especially in hot climate countries. Future water technologies will probably find solutions that are compatible to climate changes in a resilient way, like capturing stormy rains (e.g. Sydney, Catherina), or capturing water from the air. It is also important to respect and regenerate the natural hydrology of the land at the same time. Impacts on ecosystems could be devastating, since impacts on the long term might be unknow for us, therefore careful investigation in the topic would be necessary.

**Resources:** Resources and materials should be utilized responsibly. On the one hand, artificial materials should be replaced with sustainable natural materials, on the other hand, intelligent, multifunctional materials (e.g. phase changing materials, nano-technology) could be applied which can help optimizing the building's operation and enhance energy efficiency. Efforts should be made to achieve zero waste, via the application of more closed material cycles, circular economy should be applied in practice instead of being just a theory.

**Equity**: Equity may be defined as a state in which all people, regardless of their socioeconomic, gender, racial or ethnic grouping have fair and just access to the resources and opportunities necessary to thrive. The equity-focused value proposition at all levels is rooted in transparency, collaboration and trust.
Current design frameworks that are for promoting the inclusion of children, elderly people or disabled citizens, furthermore enhancing gender equality should be further extended. For instance, current examples/practices of providing passive buildings with low utilization costs for social housing could be further developed by providing buildings with (close to) zero utilization costs or energy positive houses, that enable generating income via selling/sharing the excess energy harvested on site, thus supporting vulnerable people to achieve better position in society.

"Organizations that espouse fair, equitable and just treatment towards their workforce help create a culture of reduced stress and greater employee satisfaction, as well as a heightened sense of loyalty. Research shows that high levels of perceived justice in the decision-making process at work are correlated with a lower risk of poor health, whereas declining levels of perceived justice can in turn increase such risk." (International WELL Building Institute, 2017)
Equity value will lead planners to design better quality of housing, access to clear air and water correlate with location to greatly influence life expectancy. Equity serves both populations and restorative buildings in justice performance to more socially and environmentally conscious of design influencing to create equitable space for all.

Equity in restorative buildings produces a set of comprehensive tools to be implemented efficiently while considering aspects/indicators of: public participation in decision making, people, location, nature, materials, welfare, wellbeing, air and water quality, stakeholders. Equity has to be a strong inherent value to next generations in their relationships with the built restorative environment.

**Education:** The change of teaching system, school structure has already started, according to current trends, interdisciplinary studies are replacing the conventional lecture- or course-based education, thus classrooms seem to be less needed in the future, more open spaces providing place for cooperation, interactions, workshops, co-study are needed instead (e.g. development concept of Moholy-Nagy University Campus, Budapest, Hungary). This new approach needs differing types of building functions or design, different types of places within buildings.

In time of growing pressure on the world's ecosystems, increasing awareness of the value of ecosystem goods and services, biodiversity loss and a need to adapt to changing climate, these important reasons make human beings in all ages to think about the ways how to cope with these issues. The way to do it is using educational systems and tools to teach, to explain, to guide and to instruct people through skilled experts from diverse multi disciplines of educational domains with regards to different peer groups such as childhood, adolescents, elderly people, disableds etc.

In addition, since our world is becoming more technological, the education agenda for restorative building will need to adapt scientific attitude and tools to enable changing the curriculum networks among all levels of education starting from kindergarten to university, in vocational training schools including the commerce and industrial sectors.

The educational system will base the new relationships towards strengthening the bonds between nature, biophilic design, biodiversity, buildings and other ecosystems which have impacts on mankind. Citizens will take an important task working with experts and researches from the academia and other research institutions and organizations to understand the scientific effects of climate change.

# LITERATURE / REFERENCES


BREEAM UK. (2014). BREEAM UK New Construction, Non-Domestic Buildings, Technical Manual (Issue 5.0).

Brown, M. (2008). Carbon Footprint Study – Elevate Constructing the Future / Groundwork

Brown, M. (2016). Futurestorative – Working towards a new sustainability. RIBA.

Cole, R. J. (2012). Regenerative design and development: current theory and practice. Building Research & Information. 40(1):1–6.

Cole, R. J. (2012). Transitioning from green to regenerative design. Building Research & Information. 40(1):39–53.

Ellabban, O.; Abu-Rub, H.; Blaabjerg, F. (2014). "Renewable energy resources: Current status, future prospects and their enabling technology". Renewable and Sustainable Energy Reviews. 39: 748–764 [749]. doi:10.1016/j.rser.2014.07.113.

EPA (2016) https://archive.epa.gov/greenbuilding/web/html/about.html

European Commission. (2017). EU climate action. Retrieved from https://ec.europa.eu/clima/citizens/eu_en

European Commission. (2018). Buildings. Retrieved from https://ec.europa.eu/energy/en/topics/energy-efficiency/buildings

Faragó, T., Láng, I., & Csete, L. (2010). Climate change and Hungary: mitigating the hazard and preparing for the impacts: (The "VAHAVA" report). Retrieved July 21, 2013 from http://www.vahavahalozat.hu/files/vahava-2010-12-korrigalt-2.pdf

Gaia Group. (2008). The Domestic Chemical Cocktail. http://www.gaiagroup.org/include/pdf/publications/The%20Domestic%20Chemical%Cocktail.pdf

German Sustainable Building Council. www.dgnb-system.de/en

GSTC. (n.d.). Glossary. Retrieved from https://www.gstcouncil.org/gstc-criteria/glossary/

Guy, B., & Ciarimboli, N. (2005). Design for Disassembly in the built environment. Retrieved from https://your.kingcounty.gov/solidwaste/greenbuilding/documents/Design_for_Disassembly-guide.pdf

International Living Future Institute. (2018). Energy Petal. Retrieved from https://living-future.org/lbc/energy-petal/

International WELL Building Institute. (2017). Organizational transparency. Retrieved from http://standard.wellcertified.com/mind/organizational-transparency

Kohlstedt, K. (2015). Urban Algae Canopy Produces a Forest's Worth of Oxygen Daily. Retrieved from http://weburbanist.com/2015/05/10/urban-algae-canopy-produces-a-forests-worth-of-oxygen-daily/

Loftness, V. (2013). Biophilia, Human Health and Productivity. Retrieved from https://www.phipps.conservatory.org/assets/documents/Loftness_Biophilia,_Human_Health_and_Productivity.pdf

Ma, B. (2013). Net positive water. University of Waterloo. Retrieved from http://hdl.handle.net/10012/7615

Mang P, Reed B. (2012). Designing from place: a regenerative framework and methodology. Building Research & Information. 40(1):23–38. DOI: 10.1080/09613218.2012.621341

McDonough, W. (2016). Carbon is Not the Enemy. Nature, 539(7629), 349-351. DOI:10.1038/539349a.

NIBS. (2015). National BIM Standard-United States, 1–15. Retrieved from www.nationalbimstandard.org

Nugent S. et al. (2016). Living, Regenerative, and Adaptive Buildings. Retrieved from https://www.wbdg.org/resources/living-regenerative-and-adaptive-buildings

Orosz, É. (2012). The changing interpretation of the term brownfield, Space and Society.

du Plessis C. (2012). Towards a regenerative paradigm for the built environment. Building Research & Information [Internet]. 40(1):7–22. DOI: 10.1080/09613218.2012.628548

Reed, W. G. (n.d.). Trajectory of Environmentally Responsible Design. Retrieved from http://www.integrativedesign.net/trajectory

United Nations Environment Program (UNEP) and Division of Technology Industry and Economics (DTIE), Eco-house Guidelines, pp. 5-6, 2006.

Veolia. (2016). Net positive water: what does it mean and is it possible? Retrieved from https://www.veolia.com/anz/net-positive-water-what-does-it-mean-and-is-it-possible

World Economic Forum. (2016). The Global Risks Report 2016 11th Edition. Retrieved from http://www3.weforum.org/docs/GRR/WEF_GRR16.pdf

ZEBRA2020 – Data tool. (2017). http://www.zebra-monitoring.enerdata.eu/nzeb-activities/panel-distribution.html#nzeb-definitions-by-country.html

# CASE STUDIES

NAME
Cuerden Valley Park

LOCATION
Preston, UK
Latitude: 53.707722 | Longitude: -2.663086

CLIENT / BUILDING OWNER
Cuerden Valley Park Trust

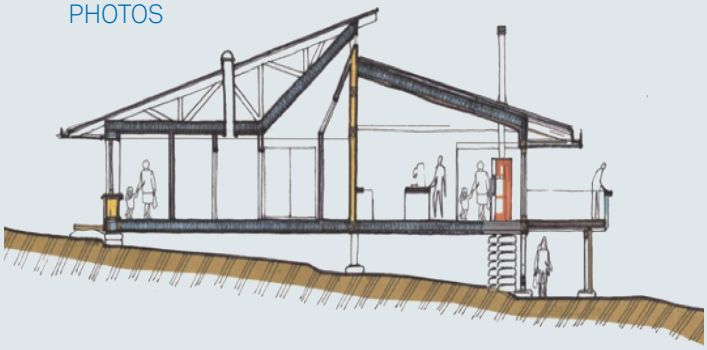
PROJECT TEAM
DESIGN, MATERIALS SPECIFICATION:
Barbara Jones, Straw Works
PROJECT MANAGEMENT: Simon Thorpe,
John Stainton CVP Trust
CONSTRUCTION: CVP Trust Volunteers. Straw Works Training Courses.
LIVING BUILDING CHALLENGE / SUSTAINABILITY ADVISOR: Martin Brown. Fairsnape

THEME / TYPOGRAPHY
NEW BUILDING
public

CONSTRUCTION / COMPLETION YEAR
2018

BUILDING
This Visitor Centre has been designed and constructed to meet the requirements of the Living Building Challenge. The design concept is driven by the desire not only to minimize the impact of fossil fuel energy reserves during the building phase but also to consume minimal fossil fuel energy during the lifetime of the building. Natural and local materials will be used where possible and those selected will have low embodied energy. The building sits on foundations made from old tyres compacted with stone. The outer walls were built using straw bales, finished with lime rendering and much of the wood used in the building is from larch trees grown in the Park. In addition no concrete, PVC, nor formaldehyde releasing materials have been used in our building's construction or furnishings. The building, the first LBC registered project in the UK has been designed and constructed to be Red List compliant and is currently seeking Living Building Certification.

PHOTOS



*Cuerden Valley Park – under construction (https://cuerdenvalleypark.org.uk/visitor-centre/#jp-carousel-531)*

REGENERATIVE SUSTAINABILITY
**Place:** Designed and constructed on biophilic design principles, the building's purpose is to reinforce the buildings connection with nature, inspire visitors to explore, enjoy and better understand the park's biodiversity. The café offers inspiring views over the River Cuerdon and the Park from a prominent position near the Arboretum.

**Energy:** Solar panels on the adjacent barn generate energy for the visitor center. The building utilises a ground source heat pump to provide under floor heating, and benefits from passive solar gain from the large double glazed windows.

**Carbon:** Due to the design and materials, predominantly local, waste and repurposed materials, used in construction it is anticipated the building will be carbon negative. The timber-framed, straw bale construction contains no cement and is Red List material compliant. Construction was through local volunteer and contractors, minimising travel carbon.

**Water:** Toilets are flushed with harvested rainwater feed into and collected from large underground tanks. Future reed beds and wetland areas will deal with blackwater discharge.

**Resources:** The build utilises recycled tyres for the foundation, timber frame, straw bales infill for the walls, sheep's wool insulation, lime plaster walls and shingles for the roof. Most of the wood has been sourced from the Park. Internal furnishings and furniture has been repurposed. Although still to be verified the building has been designed and constructed to be Red List compliant.

**Education:** In addition to public café and educational facilities, the Visitor Centre will provide space for Trust staff. The project is a volunteer and community built project which incorporates on-project craft training in straw-bale construction and other crafts. The Visitor Centre will also provide a new space for the Park's established environmental education program with local schools, and will become a hub for the UK Living Building Challenge Collaborative.

AWARDS / (certificates)
Seeking Living Building Challenge full petal certification.

LINKs
cuerdenvalleypark.org.uk/visitor-centre-details

CONTRIBUTOR: Szabina Várnagy

NAME
Straw bale residential house

LOCATION
Túrkeve, Hungary

CLIENT / BUILDING OWNER
Private owner

PROJECT TEAM
ARCHITECT: Titusz Igaz
CARPENTRY: Design 93 Bt.

THEME / TYPOGRAPHY
NEW BUILDING
residential

CONSTRUCTION / COMPLETION YEAR
2016

BUILDING
Straw bale residential house in Hungary. There is an increasing interest in the straw bale houses in Hungary, which is mainly because it is a natural building material. Straw has excellent heat insulation properties and can control indoor humidity levels. Healthy and environmentally friendly houses can be built from straw, for a relatively reasonable price.

The straw bale walls are supported by a timber frame. The walls have earth and lime-sand rendering both from the outside, and earth rendering from the inside. The roof structure is made of timber, and is covered with ceramic roof tiles.

The stove in the living room is responsible for heating, cooking and hot water during the heating season. The south-facing roof has solar PV panels and solar collectors.

(https://www.facebook.com/szalmahaztervezo/posts/695249050659160).

## PHOTOS

*Straw bale residential house in Hungary, (https://www.facebook.com/szalmahaztervezo/photos/pcb.695249050659160/695246857326046/?type=3&theater)*

## REGENERATIVE SUSTAINABILITY

**Energy:** Straw bale buildings have excellent heat and sound insulation properties. Little heating and cooling energy is required. The possibility of summer overheating is very small, so there is no need for air conditioning. The building uses renewable energy, there are solar PV panels and solar collectors on the south-facing roof.

**Carbon:** The straw bale construction has low embodied CO2 emissions.

**Resources:** Non-emitting materials were used during the construction.

**Wellbeing:** With natural renders, they provide optimal humidity for humans. Straw houses are characterized by a healthy indoor climate. Since there is no need for air conditioning, airborne pathogens appearing in the air conditioners are not present.

**Equity:** The building materials are cheaper than in a traditional building, so these houses are more affordable. Straw bale buildings require more on-site work, however, this is an excellent opportunity for so-called Kaláka (Kaláka is a Hungarian word for volunteer and community building and construction works.).

**Education:** Since the designer also teaches architects at the university, students get to know the architectural use of the straw bale during their university education.

## AWARDS / (certificates)

No data available

## LINKs

More information: (https://www.facebook.com/szalmahaztervezo/posts/695249050659160 ).

CONTRIBUTOR: Szabina Várnagy

NAME
Phipps Center for Sustainable Landscapes

LOCATION
Pittsburgh, PA, USA
Latitude: 40.438209 | Longitude: -79.948518

CLIENT / BUILDING OWNER
Phipps Conservatory and Botanical Gardens

PROJECT TEAM
ARCHITECTURAL: The Design Alliance Architects
INTERIOR DESIGN: The Design Alliance Architects
MEP: CJL Engineering
LIGHTING DESIGN: CJL Engineering
GEOTECHNICAL: Civil & Environmental Consultants Inc. (CEC)
CIVIL: Civil & Environmental Consultants Inc. (CEC)
LANDSCAPE: Andropogon
STRUCTURAL: Atlantic Engineering Services
SPECIALTY CONSULTANTS: Evolve EA, 7group
CONTRACTOR:Turner Construction

THEME / TYPOGRAPHY
NEW BUILDING
public

CONSTRUCTION / COMPLETION YEAR
2012

BUILDING
Phipps Conservatory and Botanical Garden's mission is to inspire and educate all with the beauty and importance of plants, advance sustainability and human and environmental wellbeing through action and research, and to celebrate its historic glass houses. The mission of the organization is evident in the Center for Sustainable Landscapes (CSL). A restored brownfield is now a productive place that takes what it needs from what is available to it, and provides a healthy environment for life to thrive. True to the Phipps mission, the ongoing work at the CSL is based on recognizing vital and positive connections between people, plants, beauty, health, and focuses on awakening children to nature and encouraging sustainable, healthy lifestyles.

The CSL's goal to meet the Living Building Challenge helped create a building that, over course of the 2013 calendar year, demonstrated that it operates as net zero energy facility. Moving forward, the operations team continues to engage occupants into how the facility maintains a net zero energy status, and continues to actively monitor performance with constant feedback loops to operators and occupants.

(https://www.phipps.conservatory.org/green-innovation/at-phipps/center-for-sustainable-landscapes; @phippsgreen)

PHOTOS

*Phipps Center for Sustainable Landscapes, (https://www.phipps.conservatory.org/green-innovation/at-phipps/center-for-sustainable-landscapes-greenest-building-museum-garden-in-the-world)*

REGENERATIVE SUSTAINABILITY

**Place:** The Center for Sustainable Landscapes project was built on brownfield site previously developed by the City of Pittsburgh's Department of Public Works.

**Energy:** Net positive energy – passive-first strategies were coupled with high-performance and innovative technologies to ensure the active systems are as efficient as possible. The CSL is a long, relatively narrow building on an east-west axis, which allows for maximizing southern exposure. High-performance glazing on the north and south facades permit solar gain in the cold months, while louvers and strategic deciduous tree plantings prevent unwanted heat gain and glare in the warm months.

**Carbon:** The design team's approach to energy efficiency was to use outside-in, passive strategies first. To this end, the atrium was designed to house large amounts of concrete to act as thermal mass, increasing energy efficiency. However, concrete embodies large amounts of carbon relative to other materials due to its manufacturing process. To mitigate some of this carbon, fly ash was used in lieu of Portland cement, one of the most water carbon intensive components. Recycling fly ash, which is a waste product of combustion, also keeps the material out of landfill where it would usually be sent. In calculating the embodied carbon of the CSL, Phipps partnered with faculty and students from a local university to conduct a comprehensive life cycle assessment of its assembly and operations.

**Water:** The water needs for the CSL are supplied by captured rainwater, while potable water is drawn from municipal sources per the temporary exception due to local health regulations. Due diligence was performed with all appropriate agencies.

All irrigation, toilet flushing and janitorial and equipment uses are supplied by captured rainwater. Roof runoff from both the CSL and an adjacent, non-project structure, is captured in a 1500-gallon cistern used for landscape irrigation (when necessary). Any overflow is diverted into a roughly 100,000-gallon lagoon. The lagoon serves as a landscape feature, a home to native turtles and fish and is accessible to visitors via a surrounding boardwalk.

**Resources:** The dense deciduous forests of Western Pennsylvania are a defining portrait of the region. From the projects inception, the project team intended to craft the building and landscape design in a way that complements this regional identity. For the outer "skin," which gives the building its signature appearance, the CSL team harvested wood from nearby decrepit barns, some dating back to the late 1700s. The tree species seen in these boards include oak, hickory, hemlock, white pine, and chestnut – displaying reverence for the history, and a case for forest preservation through the use of FSC standards.

The on site lagoon is framed by a rustic boardwalk built from FSC-certified wood. Through exploring local FSC-certified options for the boardwalk and other uses, the project team established new supply chain linkages, and also convinced a local millworker, Giffin Interiors, to become an FSC-certified shop.

Salvaged materials comprise 10% of those used to build the CSL, including siding made from deconstructed western Pennsylvanian barns, Belgium block, granite, and old Department of Public Works fuel tanks that have been safely converted to store cleaned sanitary water. When performing due diligence when sourcing doors, the design team was unable to find wooden doors that did not contain added formaldehyde. Rather than using glass or metal doors that may have clashed with the aesthetic, the team was able to acquire them from a nearby office building undergoing a renovation.

**Wellbeing:** Phipps developed the BETA (Biophilia Enhanced Through Art) Project, a new art exhibit staged throughout the building and surrounding landscape. The BETA Project brings a new dimension of sensory engagement to the CSL, creating dozens of opportunities for visitors to experience nature's beauty through the lens of the artist. To reflect a diverse array of voices while reinforcing the CSL's western Pennsylvania locality, the exhibit features mostly local artists, but also a dynamic mix of international artists such as Dale Chihuly and Hans Godo Fräbel.

**Education:** Through presentations, docent-led tours and dynamic science education programs, the CSL reinforces the importance of human-environment interactions. The CSL's indoor and outdoor classroom spaces, give children a chance to connect to nature, instilling a sense of wonder and fostering the growth of tomorrow's environmental stewards. In this way, the CSL will catalyze the kind of change that results in stronger, healthier and more equitable communities. The CSL will soon be supplemented by the addition of a SEED classroom – a net-zero energy, net-zero water modular learning space and a Living Building Challenge renovation of the old Public Works building on site.

AWARDS / (certificates)
Living Building Challenge, the world's most rigorous green building standard
LEED® Platinum — tied for the highest points awarded under version 2.2
First and only Four Stars Sustainable SITES Initiative™ (SITES™) for landscapes project (pilot)
First WELL Building Platinum project (pilot)

LINKs
https://www.phipps.conservatory.org/green-innovation/at-phipps/center-for-sustainable-landscapes-greenest-building-museum-garden-in-the-world
https://living-future.org/lbc/case-studies/phipps-center-for-sustainable-landscapes/
https://www.wellcertified.com/en/projects/center-sustainable-landscapes

CONTRIBUTOR
Szabina Várnagy

# 05 REGENERATIVE HERITAGE

AUTHORS
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FARO DISCUSSION GROUP CONTRIBUTORS
Lisanne Havinga


*Figure 6: REGENERATIVE HERITAGE: RESTORE Vision towards a regenerative Future. Main idea, scale, key topics and related concepts. © authors*

# KEY DEFINITIONS

## HERITAGE

Heritage represents the history, traditions, environment and historic buildings of a country or area, seen as something to be passed on in good condition to future generations (Bateman et al., 2005). The term heritage is usually associated with unique natural features and areas, as well as buildings of significant historical and/or architectural value. However, in the recent period even industrial buildings, often associated with workers' settlements, have been largely observed as heritage. Hence, the process of selection of historical elements that will be represented as heritage is always related to construction, reconstruction and deconstruction of memory and identity (McDowell, 2008).

**Conservation –** all the processes of looking after a place so as to retain its cultural significance. It includes maintenance, and according to circumstance may include preservation, restoration, reconstruction and adaptation and will be commonly a combination of more than one of these.

**Maintenance –** the continuous protective care of the fabric, contents and setting of a place are to be distinguished from repair. Repair involves restoration and reconstruction, and it should be treated accordingly.

**Preservation –** maintaining the fabric of a place in its existing state and retarding deterioration.

**Restoration –** returning the existing fabric of a place to a known earlier state by removing accretions or by reassembling existing components without the introduction of new material.

**Reconstruction –** returning a place nearly as possible to a known earlier state and is distinguished by the introduction of materials (new or old) into the fabric.

**Re-use –** Re-using the building, continuing its original function despite its technology

**Re-vitalizing -** Re-using the structure while instating a new function.

## PLACE

**Site –** places, area, building or other work, group of buildings or other works together with associated contents and surrounds.

**Location –** a particular position on Earth defined by absolute or relative references. Absolute location is represented by geographical (latitude and longitude) or projected coordinates or street addresses. Relative location is defined in relation to other features in the area (e.g. distance from a certain object).

**Place –** refers to the physical and human aspects of a certain area. It can vary from a precise location (site) to a rather large area that is sometimes difficult to define. It includes various geographical characteristics of the location (relief, hydrology, climate, vegetation, human settlements, culture, economy, way of life etc.) (World Atlas, 2017), which makes every place unique and different from other places, giving it its identity. People that live or reside in a place can develop place attachment, which means that they associate their memories, feelings, experiences and perception with the place.

**Sense of place** is a social phenomenon that exists independently of any one individual's perceptions or experiences, yet is dependent on human engagement for its existence (Ng, 2013). It is often used in relation to those characteristics that make a place special or unique, as well as to those that foster a sense of authentic human attachment and belonging (Knox and Marston, 2017). Such a feeling is often made up of a mix of natural and cultural features in the landscape, and generally includes the people who occupy the place (Convery et al., 2012).

**Cultural significance -** aesthetic, historic, scientific or social value for the past, present or future generations.

### SOIL

Soil, the biologically active, porous medium that has developed in the uppermost layer of the Earth's crust. Soil is one of the principal substrata of life on Earth, serving as a reservoir of water and nutrients, as a medium for the filtration and breakdown of injurious wastes, and as a participant in the cycling of carbon and other elements through the global ecosystem. It has evolved through weathering processes driven by biological, climatic, geologic, and topographic influences (Encyclopaedia Britannica, 2018).

### RESTORATIVE HERITAGE

Restorative Sustainability pursues to restore the capability of social and ecological systems (Brown 2016). Thereby Regenerative Heritage can be recovered by increasing the accessibility, its flexibility and the hybridization of functions that can be developed within it. Adaptive reuse should be the preferred strategy for restorative heritage when no other reuse option is available and should always be favored over demolition and redevelopment.

### REGENERATIVE HERITAGE

Restorative Sustainability is seen as a future level where social and ecological systems are enabled to continuously regenerate and evolve (Brown 2016). The final output of a Regenerative Heritage approach should be the creation of a space that is able to revitalize the surroundings and the context where it is placed.

## INTRODUCTION

Understanding a regenerative, sustainable future for our built environment necessitates a deep understanding of our existing heritage as living buildings. Our living heritage buildings are sharing memories of place from the past and providing us with lessons for the future. **Preservation, Restoration, Reconstruction, Re-use and Re-vitalizing** as explored within this paper, are vital approaches to ensuring our living heritage maintains its cultural richness whilst ensuring an ecologically sound and socially just future.

Heritage represents the history, traditions, environment and historic buildings of a country or area, seen as something to be passed on in good condition to future generations (Bateman et al., 2005). The term heritage is usually associated with unique natural features and areas, as well as buildings of significant historical and/or architectural value. However, in the recent period even industrial buildings, often associated with workers' settlements, have been largely observed as heritage. Hence, the process of selection of historical elements that will be represented as heritage is always related to construction, reconstruction and deconstruction of memory and identity (McDowell, 2008).

The theoretical approach to sustainability and cultural heritage starts from the concept of **RE-USE.** First, not every corner can be an urbanized land, because it goes against modern theories of sustainable urbanization, which underline the fact that by 2050, 80% of the world population will be concentrated in cities. This will be followed by overcrowding and shortage of fertile surfaces. So re - use of buildings in this regard is meaningful.

**RE-VITALIZATION** is another valuable theoretical concept. Certainly the establishment of some new functions associated and activities within the former heritage site would give another dimension to the area, the dimension of public realm, space and social life.

With **Sustainability,** we mean revitalization and readapting, the use of flexible and eco-friendly materials in the process of giving the adequate image and role to these very important and full of history areas of the city. Another important aspect of sustainability is the urban design, mobility and landscape of abandoned spaces. We can use so many good and efficient examples in terms of sustainability and conservation.

The subordinate approach, based on restorative or regenerative sustainability (Brown 2016), is **Regenerative Heritage**. The idea is to go beyond existing standards of reducing negative impacts, and to move from standardized solutions to locally, culturally and environmentally integrated built environments. Thereby **Restorative Sustainability** pursues to restore the capability of social and ecological systems, while **Regenerative Sustainability** is seen as a future level where social and ecological systems are enabled to continuously regenerate and evolve.

## VISION – WHERE WE WANT TO GO!

**LIVING HERITAGE:** Increase Heritage Consciousness, Restaorative- Regenerative Heritage with sustainable function, materials and accessibility, integrated into the environment and creating catalyst effects for regenerative sustainability.

- (New) Catalyst function of Regenerative Heritage
- Approach to assess heritage / abandoned industrial structures/areas (use, functions and socio-economic processes)
- Significant re-use and revitalization strategies related to the local context and residents
- Reflect approaches for urban regeneration of heritage sites: Re-development, Rehabilitation, Integration

**RESTORATIVE HERITAGE** can be recovered by increasing the accessibility, its flexibility and the hybridization of functions that can be developed within it. The final output should be the creation of a space that is able to revitalize the surroundings and the context where it is placed. Adaptive reuse should be the preferred strategy for restorative heritage when no other reuse option is available and should always be favored over demolition and redevelopment.

This vision can be applied after an assessment is done and after the consciousness for such heritage is raised. The steps to be followed for heritage site regeneration are shown at the example of industrial buildings (Luca 2017).

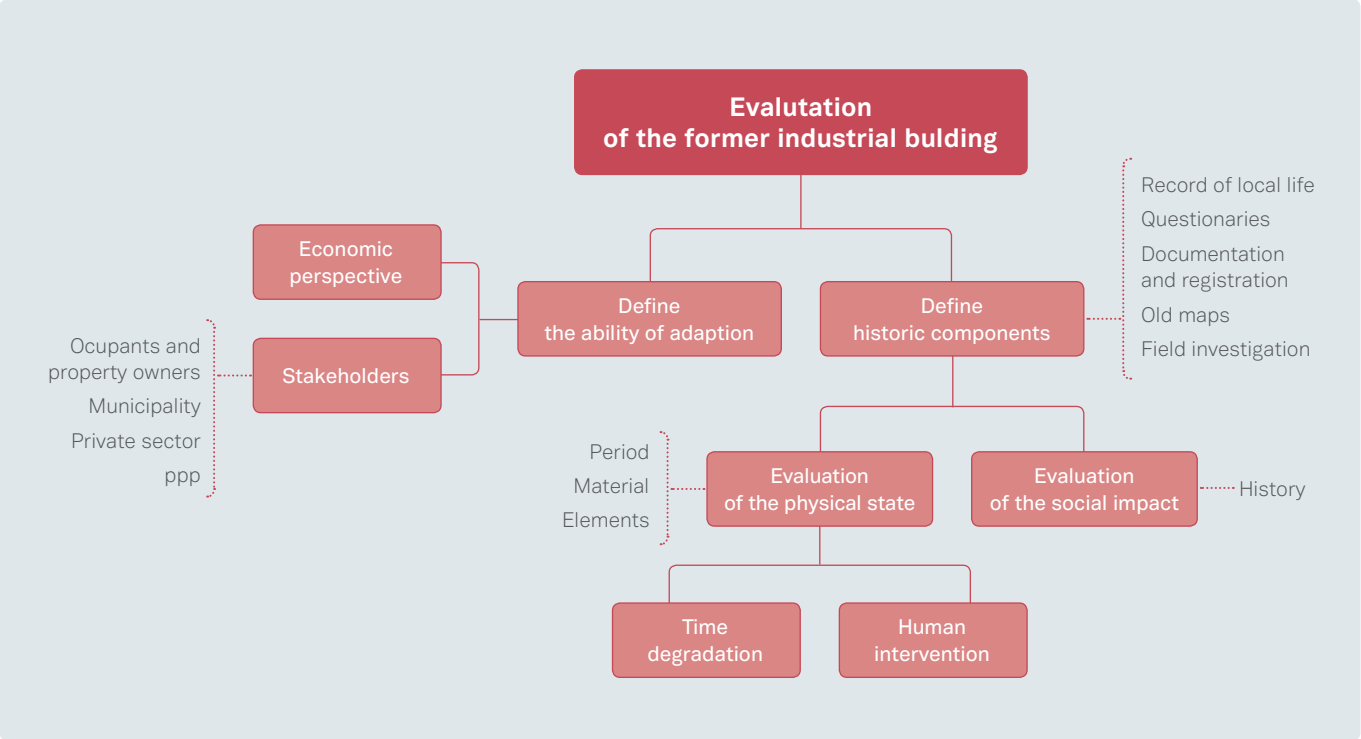



*Figure 7: Evaluation scheme for industrial heritage. © Luca, E. 2017*

## APPROACHES FOR URBAN REGENERATION OF HERITAGE SITES

### a) Re-development

Redevelopment, known as demolition of existing buildings and re-use of cleared land for the implementation of new projects. This approach is applicable to cases in which objects are in seriously deteriorated condition and not worth preserving and could not provide satisfactory living conditions.

### b) Rehabilitation

Rehabilitation, preservation or conservation as it is often called, can be defined as the opposite of redevelopment. It is based on maintaining, repairing and restoring the natural environment and man-made one in existing neighborhoods. Rehabilitation is applicable in areas where buildings are generally in good structural condition, but are deteriorating due to neglect maintenance. Rehabilitation fits well with the emerging Circular Economy.

### c) Integration

The third approach to urban regeneration, known as integration, this concept sees rehabilitation and redevelopment as complementary forces and combines the best aspects of both approaches (Zhu Zixuan 1981)

Our Vision for Sustainable Development: 'The recognition, mainstreaming and effective contribution of cultural heritage as a driver and enabler of sustainable development in the process of implementing the United Nations Agenda 2030 and Sustainable Development Goals." (ICOMOS Action Plan 2017, p. 4)

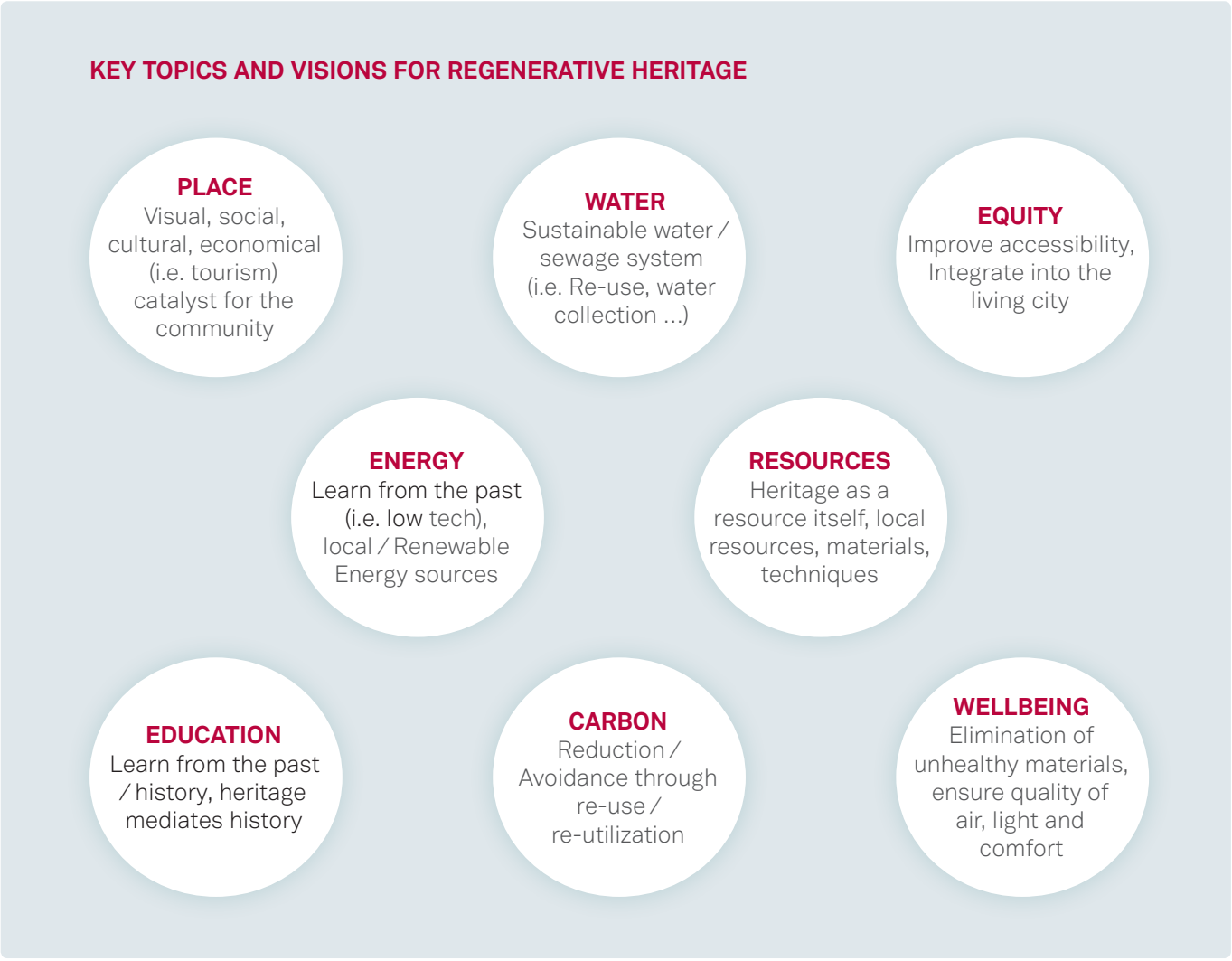



*Figure 8: Key topics and visions for Regenerative Heritage. © authors*

# STATE OF THE ART FOR REGENERATIVE HERITAGE – WHERE WE ARE!

**The State of the art regarding existing building stock is considered to be "non sustainable" in terms of use, materials, function, accessibility and regeneration.**

We derived this conclusion by analyzing the following key topics using the example of industrial buildings: **Place, Energy and carbon, Water and Resources, Wellbeing, Equity and Education.**

**Place** – low accessibility to the zone (i. e. suburban or restricted zones of industrial settlements), pollution of the area, visual degradation of the landscape, occupation of central areas that could benefit from other functions, urban growth of the city where the heritage is located, problems of ownership, lower prices of real estates in the surrounding areas, insecurity. Heritage is often considered as a barrier to (more rapid) urban development. People attribute memories related to a heritage area with no real architectonic or historical value and resist to any transformation of the area.

- Industrial heritage is often located in suburban or restricted zones of the city, remote from the city center, and therefore, with lower accessibility to the zone.

- Unused or abandoned former industrial facilities, especially those non-maintained and left to decay, degrade visually the landscape, contributing to lower prices of real estates in the surrounding areas and the impression of insecure areas. Beside visual degradation, abandoned industrial sites can cause pollution of air, surface and ground water.

- Former industrial buildings in the cities occupy attractive areas that could benefit from other functions and they are often considered as a barrier to (more rapid) urban development. Beside ownership problems, that often disable any changes in development of former industrial sites, local residents very often attribute memories related to a heritage area or even to an area with no real architectonic or historical value and resist to any transformation.

- Integration of the renewed heritage sites into the city often do not achieve success due to lack of quality urban planning (site planning vs. integral planning).

- In real or potential tourism areas there is a tendency of converting historical sites into museums (musealization), instead of adding another function that would give the wider area a character of a living city. Beside the positive side of revitalization of heritage, that process has a negative side – those areas are often used only in the tourist season and in the rest of the year, they are empty.

**Energy and carbon** – there is no relationship between renewable energy and historic buildings, lack of aesthetic adaptation, lack of insulation and ventilation, LCA impact in terms of construction and transportation, carbon impact, contradictory between energy efficiency measures and protection of monuments (i. e. aesthetic changes due to insulation), historic building concepts specifically addressing industrial use (i. e. no heating or only residual heat of the industrial production) can only be adapted to other uses (for example living) with great effort.

There is a growing awareness that new constructions, generating more energy than they use, (for example as Living Building Challenge projects do) can assist in providing energy to heritage buildings that are unable to generate renewable energy themselves.

**Water and resources** – heritage is not considered as an economic resource by itself. There is the opportunity however to view heritage buildings and their components through the lens of the circular economy. As an alternative to demolition, building components can be transplanted into other or new constructions and so preserve memories and cultural from the original building.

> The Ellen MacArthur Foundation sees cities where "*Components of buildings will be maintained and renewed when needed, while buildings will be used where possible to generate, rather than consume, power and food by facilitating closed loops of water, nutrients, materials, and energy, to mimic natural cycles*" (Ellen MacArthur Foundation 2017, Cities in the Circular Economy).

**Wellbeing** – new forms of gathering, indoor air quality, participation, rehabilitation in terms of structure and energy, sustainability of the city and the buildings (use and value), memory.

**Equity** – heritage buildings have been generally designed and constructed without todays view on equity, human access for all and building user health & wellness consideration. It is essential that equity is seen as a core imperative in heritage building reuse and revitalization.

**Education** – continuing knowledge, memory awareness and recognition (people and government), heritage is a vital element of sustainability, not to be excluded from ambitious restorative approaches.

The actions that should be taken after analyzing the state of the art of former industrial buildings focus on Conservation of the memory in terms of people, place and buildings. Recognition from both public and private sector to conserve memory in continual use is a key element in the regeneration process.

- Through re-vitalizing heritage buildings, we can ensure buildings and cities make a positive contribution to their community, place and the Sustainable Development Goals, not just making buildings 'less bad'
- The heritage per se is excluded from energy standards, but these buildings should be included in the energy efficiency regulation.
- They are becoming threats for new buildings because in some cases they become a barrier to development because of the ownership issues, hence the government should facilitate and regulate all the ownership issues.

## GAP ANALYSIS – What we need!

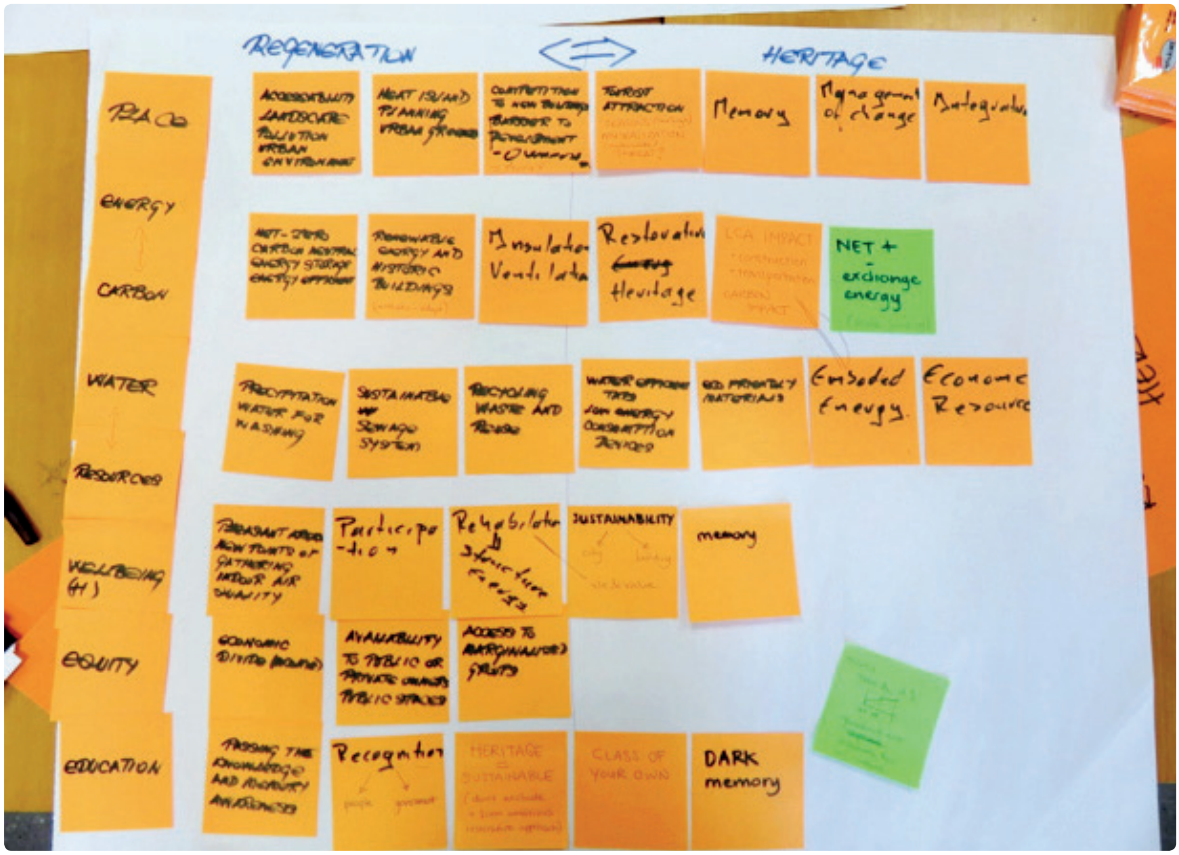



*Figure 9: Regenerative Heritage, brainstorming outcomes in Faro, 2017. © authors*

In order to overcome the state of the art as described for industrial heritage in the previous chapter and to propose the right vision we have to conduct a gap analysis.

**Assessment to increase the consciousness on heritage and to valorize it through restorative regeneration.**

The assessment should pass through the following elements:

- The surrounding environment and environmental conditions (place).
- The vicinity to the urbanized area (the accessibility of the zone).
- The existing conditions of the former industrial building.
- The current function of the former industrial zone (in some cases is partially existing industrial zone).

We need to increase the awareness of the young generation through educational programs (university courses, high schools) with multidisciplinary approach (history, architecture, civil engineering, geography, sociology). Afterwards we need the creation of a general platform with all the information about heritage, recognition and promotion. The final outcome of such inpute should be the shift from conservation point of view to regeneration and to put into function (keep real) after the consult with professionals and locals.

The government and the private sector should think about the wellbeing for the heritage, buildings and people. This can be done through the introduction of new public areas, flexibility of functions, wellbeing, activities, buildings and surrounding areas. The heritage itself should be considered as a catalyst of functions and activities, not only for the surroundings but for the whole city.

The process of rehabilitation should take into consideration the sustainability of the use and of the building. The heritage should be considered as a resource itself in terms of economy (green profit), in terms of construction materials and land, in terms of Palimpsest (conserving the footprint).

In terms of bringing back the memory of industrial heritage one of the most important things to be done is to increase the accessibility in terms of information and physical connection. This can be done through:

- the enrichment and restructuring of the heritage landscape,
- cleaning the zone from the physical and chemical pollution that can transform a brownfield area into a new appealing urban space that can affect positively surrounding zones.

The major challenge that rose from our gap analysis was the management of change and the integration process. People many times resist to changes, so in order to overcome this obstacle we should give to the industrial heritage flexible function but we should keep elements of the history. In order to bridge the gap two important conditions, have to be met: (1) ownership issues and (2) urban and regional planning.

Lack of investment into industrial brownfield areas is often caused by ownership problems, whose solving represents the most important pre-condition for any kind of development. Those problems can be solved only in coordination with local and national government. Quality spatial planning has the role of analysis and proposing the most adequate use and function of a building or an area in order to achieve the highest economic, social, cultural and environmental benefits.

# LITERATURE / REFERENCES


Bateman, H., Harris, E., McAdam, K. (eds.), 2005: Dictionary of Leisure, Travel and Tourism (Third Edition), A & C Publishing, London.

Boarin, P., 2016. Bridging the gap between environmental sustainability and heritage preservation: towards a certified sustainable conservation, adaptation and retrofitting of historic buildings.

Zuo J, Daniel L, Soebarto V. (eds.), Revisiting the role of Architectural Science in Design and Practice. 50th International Conference of the Architectural Science Association, 7 – 9 December 2016, Adelaide, Australia. Proceedings, 675-684. http://anzasca.net/wp-content/uploads/2016/12/69-1120-675-684.pdf.

Brown, M., 2016. FutuREstorative: Working Towards a New Sustainability. RIBA Publishing.

Carbonara, G., 2015. Energy efficiency as a protection tool. Energy and Buildings, 95, 9-12. http://dx.doi.org/10.1016/j.enbuild.2014.12.052.

Castaldo V. L., Pisello A. L., Boarin P., Petrozzi A., Cotana F., "The experience of international sustainability protocols for retrofitting historical buildings in Italy", Buildings, 2017, volume 7, issue 52, pp. 1-21, ISSN 2075-5309, http://doi:10.3390/buildings7020052.

Convery, I., Corsane, G., Davis, P., 2012: Introduction: Making sense of place, in: Making Sense of Place: Multidisciplinary Perspectives (eds. Convery, I., Corsane, G., Davis, P.), The Boydell Press, Woodbridge, 1-8.

English Heritage, 2011. Energy Efficiency and Historic Buildings Application of Part L of the Building Regulations to historic and traditionally constructed buildings. Available at: https://historicengland.org.uk/images-books/publications/energy-efficiency-historic-buildings-ptl/.

English Heritage, 2013. Heritage Works. The use of historic buildings in regeneration. A toolkit for good practice. Available at: http://www.bpf.org.uk/sites/default/files/resources/Heritage-Works-2013.pdf.

Green Building Council Italia, GBC Historic Building. Manuale GBC Historic Building® per il restauro e la riqualificazione sostenibile degli edifici storici, Rovereto, 2014, pp. 652, ISBN 978-88-940959-0-6.

ICOMOS Action Plan: 'Cultural Heritage and Localizing the SDGs', Draft Version 2 (April 5, 2017), to be reviewed by ICOMOS Scientific and National Committees (http://www.icomos.org/images/DOCUMENTS/UN_SDG/SDGs_Meeting_Istanbul_201702/ICOMOS_Draft_Action_Plan_Localizing_the_SDGs_20170406.pdf)

Ellen MacArthur Foundation, 2017: Cities in the Circular Economy https://www.ellenmacarthurfoundation.org/assets/downloads/publications/Cities-in-the-CE_An-Initial-Exploration.pdf

Encyclopaedia Britannica, 2018: Soil. Pedology, https://www.britannica.com/science/soil (Accessed on 7th January 2018).

Knox, P., Marston, S., 2017: Human Geography: Places and Regions in the Global Context (4th Edition), Cram101 Textbook Reviews.

Luca E., 2017: "The reuse of Albanian Industrial Archeology as an approach to sustainability and conservation – Research on the new evidences of expression of the former industrial buildings with the implication of 3R; Retrofit, Re-Use, Revitalize. Ferrara Italy

McDowell, S., 2008: Heritage, memory and identity, in: The Ashgate Research Companion to Heritage and Identity (eds. Graham, B., Howard, P.), Ashgate, 37-54.

Ng., V., 2013: Toward a holistic understanding of sense of place: A phenomenological reading of Chew Jetty, Penang, International Journal of Humanities and Social Science 3 (20), 75-83.

Prizeman, O. (ed.), 2015. Sustainable building conservation. Theory and practice of responsive design in the heritage environment. Newcastle Upon Tyne: RIBA Publishing, pp.274.

Troi A. & Bastian Z. (Eds.), 2015. Energy Efficiency Solutions for Historic Buildings. A Handbook. Basel: Birkhäuser Verlag GmbH.

World Atlas, 2017: The Five Themes In Geography, http://www.worldatlas.com/the-five-themes-in-geography.html (24 September 2017).

Zhu Zixuan, 1981: Habitat International. Volume 15, Issue 3, 1991, Pages 133–138. "Preservation and redevelopment in Beijing" Zhu Zixuan "Revitalizing cities" H. Briavel Holcomb, Robert A. Beauregard, Association of American Geographers.

# CASE STUDIES

NAME
City Library

LOCATION
Labin, Croatia
45.09002 N, 14.12206 E

CLIENT / BUILDING OWNER
City of Labin, Croatia

PROJECT TEAM: ARCHITECT, CONTRACTOR , ETC.
Society of Architects of Istria, Croatia – project leaders (architects): Ivana Žalac, Margita Grubiša

THEME /TYPOGRAPHY
Heritage, public, library

CONSTRUCTION / COMPLETION YEAR
2013

BUILDING
Intensive coal mining since the early 19th century led to a construction of a completely new settlement next to Labin, Istria in the 1930s under the Italian rule. It included the complex of the administration buildings connected to the coalmine, as well as residential buildings for the miners. Coal mining ended in 1989 when the mine was officially closed, which left the former buildings without function. The first initiatives of revitalizing former industrial buildings came from a cultural and artistic NGO Labin Art Express that proposed an idea of the Underground City whose goal was to valorize the old coal-mining heritage and as a constitutional part of the area's identity. In 2006, the complex was inscribed on the List of Protected Cultural Goods of the Ministry of Culture and in 2007, the City administration decided to place the library in one of the conserved buildings (former administration of the coalmine). Although the new function was diametrically opposite to the previous one, the architects and conservators tried to preserve the character and the atmosphere of the building but adapted for new use. Parts of visible old structure are visible in the whole building. The interior design carefully included details from coal mining heritage, while one area (called the room of memory of coal miners) offers projections of coal miners' life.

FOTOS

*Former coal mining complex (above) and interior of the library located in the revitalized industrial building (below)*

*Sources: http://pogledaj.to/arhitektura/knjiznica-u-labinu/, http://www.labin.com/web/infodet.asp?id=10731*

REGENERATIVE SUSTAINABILITY
**Place:** This project brought into life an unused coal-mining complex in an area affected by depopulation and population ageing and offered a new public function in the predominantly residential part of the town. Revitalization of the building had also a symbolic value because it helped to preserve the identity of the area and population that suffered from closing the mines, causing unemployment and loss of the economic basis of the town.

**Resources:** Despite intensive work on the building, many parts of the original structure and decoration were conserved. "Throughout the interior space one is able to see parts of the old construction and materials; the marble walls, tiles and renovated glass brick ceiling, as well as fragments of the preserved pipes and wall tiles in the lobby and service rooms."

**Wellbeing:** The building offers a new dynamic public space with air quality and light designed according to modern standards. Old building with new function and symbols related to the area's economic history offers the visitors the combination of modern experience, memory and the local identity.

**Equity:** The building has a public function and it is equally available to all people.

**Education:** The revitalized complex offers visitors the interpretation of the economic history of Labin area and the life of coal miners, in order to preserve the memory of the significance of coal mining in that area and in the forming of its identity. Indirectly it also offers a rare good example of revitalizing of abandoned industrial heritage in Croatia.

LINKs
https://www.archdaily.com/514135/public-library-in-labin-skroz

CONTRIBUTOR
Ivan Sulc

NAME
Mostar Old High School

LOCATION
Gimnazija Mostar
43°20´31° N, 17°48´19° E

CLIENT / BUILDING OWNER
City of Mostar

PROJECT TEAM:
Architect: 3E Project Team implemented by Advanced Engineering Associates International, Inc. (AEAI)
Contractor: City of Mostar

THEME /TYPOGRAPHY
HERITAGE, school

CONSTRUCTION / COMPLETION YEAR
2012

BUILDING
"The Gimnazija Mostar is attended by approximately 900 students and 71 staff members. It was constructed in 1893 and partially renovated in 2009 to restore its original beauty. The building was built in the typical construction style of the Austro-Hungarian period, with thick walls and high ceilings. Thick walls provided sufficient thermal insulation, but the windows were single glazed and caused high heat loss and cold air infiltration."
(http://pdf.usaid.gov/pdf_docs/PA00K5HF.pdf, 2018-20-01)

"The educational information monitor is installed at the entrance to the school and displays energy savings attained and money saved, so that the students and teachers understand energy efficiency and the money savings that result from it. The school and the city will be able to invest money saved in other areas needed for the benefit of citizens."
(http://pdf.usaid.gov/pdf_docs/PA00K5HF.pdf, 2018-20-01)

**Website:** Advanced Engineering Associates International, Inc. : http://www.aeaiinc.com/
Gimnazija Mostar: http://gimnazijamostar.ba/
City of Mostar: https://www.mostar.ba/

FOTOS

*Gimnazija Mostar (http://gimnazijamostar.ba/galerija/, 2018-21-01)*

REGENERATIVE SUSTAINABILITY
(Sources: http://pdf.usaid.gov/pdf_docs/PA00K5HF.pdf
http://pdf.usaid.gov/pdf_docs/PA00K4SK.pdf)

**Place:** This project is a renovation of the heating distribution system in the old high school.

**Energy:** Reduction of usage of imported fossil fuel and 40% reduction in annual heating costs.

**Carbon:** Reduction of CO2 emissions by 22 t/year.

**Wellbeing:** Energy savings and improved thermal comfort through new windows and a modern heating control system leading to public health improvement.

**Education:** The educational information monitor is installed at the entrance to the school and displays energy savings attained and money saved, so that the students and teachers understand energy efficiency and the money savings that result from it.

LINKs

https://www.mostar.ba/vijesti_citanje-92/pilot-projekt-energetske-efikasnosti-u-gimnaziji-mostar-1716.html
http://sa-c.net/events/itemlist/tag/energetska%20efikasnost.html
http://pdf.usaid.gov/pdf_docs/PA00K5HF.pdf
http://pdf.usaid.gov/pdf_docs/PA00K4SK.pdf

CONTRIBUTOR

Dr. Sc. Haris Gekić

NAME
Miller Hull Seattle Studio

LOCATION
Seattle, WA, USA
47° 36' 28.8468" N, 122° 20' 6.6012" W

CLIENT / OWNER
The Miller Hull Partnership

PROJECT TEAM
DESIGN: Ron Rochon, Margaret Sprug, Kristin Kelsey, Matt Kikosicki, Becky Roberts, Christine Traber
ARCHITECT: The Miller Hull Partnership
CONTRACTOR: Turner Construction Company

THEME / TYPOGRAPHY
HERITAGE, Office, commercial

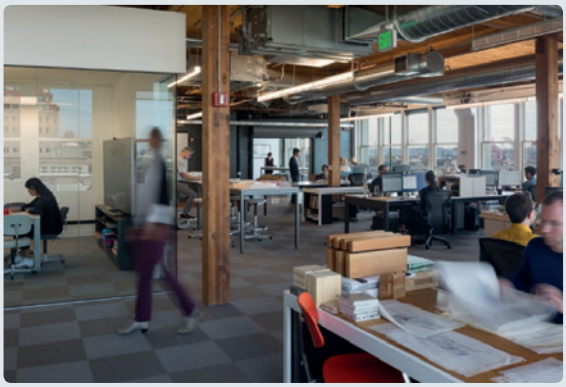
CONSTRUCTION / COMPLETION YEAR
2016

BUILDING
"Built on the values and principles of sustainability, forty years ago Dave Miller and Bob Hull founded a firm that has led the way in creating architecture that responds to and respects its natural surroundings. (...) When it came time for Miller Hull to renovate its own studio, the Living Building Challenge was the right path to represent firm values. (...) The goal of the project was to create a flexible open workplace that fosters collaboration and innovation, reflects the highest environmental design standards, highlights the site's unique attributes, is timeless, and provides a place where Miller Hull's diverse clientele can be inspired to collaboratively create unique solutions that are specific to their needs and a reflection of who they are.

The design is simple and allows for unencumbered design thinking by avoiding large-scale gestures, playful lounge zones, or ad-hoc décor. Instead, the design enhances the outstanding features of the space, such as open perimeter workstations that preserve views and natural light. This allows the project to make their only achievement in the Health & Happiness Petal with the Civilized Environment Imperative. New skylights bring daylight to the center of the space where existing walls could not be changed. Existing exposed heavy timber structure and salvaged wood floors combine with a neutral color palette to ground the space in nature." (https://living-future.org/lbc/case-studies/miller-hull-seattle-office-ti/; 2018-01-12)

Project website: http://millerhull.com/project/miller-hull-office-renovation/

FOTOS



*Miller Hull Seattle Studio: Photos: Courtesy of Lara Swimmer Photography, http://millerhull.com/project/miller-hull-studio-renovation/*

REGENERATIVE SUSTAINABILITY
(Source: LBC,https://living-future.org/lbc/case-studies/miller-hull-seattle-office-ti/)

**Place:** This project is a renovation of the sixth floor of an historic building in downtown Seattle's Pioneer Square neighborhood. (...) Miller Hull is proud to have preserved and restored a piece of Seattle's history for continued use.

**Energy:** Between lighting reduction, occupancy sensors, and new energy efficient systems, the team reduced the EUI of the space from 55 to 45 (88% savings in lighting electricity use, 25% savings in plug load electricity use, 22% overall savings in electricity use, 19% overall savings in energy use)

**Ressources & Carbon:** Materials: First, a list was created of building products and furniture that the team planned to reuse. Some of these major items included wood flooring, ductwork, some furniture and equipment. Second, the team's design aesthetic had the benefit of using few finish materials. (...) The team made a diligent effort to ensure the majority of materials originated near the site.

**Embodied Carbon Footprint:** Apart from a few unavoidable metal studs, the majority of the structural members were extremely low-carbon glue-laminated beams or columns. Minimal use of gypsum board and other finishes helped to keep the overall carbon footprint low.

**Net Positive Waste:** Miller Hull took great care and effort to salvage the majority of the existing finishes, equipment and furniture from the existing space prior to demolition. To do this, an extensive audit was completed that catalogued each item for reuse.

**Wellbeing:** Each workstation, meeting, gathering, and collaborating space is directly, naturally lit, enhancing wellbeing and productivity. In order to encourage healthy movement throughout the workday; storage, supplies, printers, copiers, and design and materials libraries are centralized. Counter height collaboration tables allow people to reposition how they work. The old galley kitchen was buried in the middle of the space without natural light or a place to sit. The new kitchen was enlarged and relocated to the perimeter to provide everyone access to the best views in the studio.

**Equity:** Just Organizations: The Miller Hull Partnership has a JUST label; a voluntary and transparent social equity disclosure program.

**Education:** "We hope this project has served as an educational effort for all involved and a reminder to our staff while we strive for ecologically-minded work in all that we do."

AWARDS / Certificates
LBC Petal Certified

LINKs
https://living-future.org/lbc/case-studies/miller-hull-seattle-office-ti/

CONTRIBUTOR
Edeltraud Haselsteiner

NAME
FRONIUS International GmbH

LOCATION
Wels, AUSTRIA
48°10'0.01"N, 14°1'59.99"E

CLIENT / OWNER
Fronius International GmbH

PROJECT TEAM
ARCHITECT: PAUAT Architekten ZT GmbH, DI Heinz Plöderl
CONTRACTOR / Technical planning: Team GMI Ingenieurbüro GmbH, DI Michael Berger

THEME / TYPOGRAPHY
HERITAGE, office, industrial

CONSTRUCTION / COMPLETION YEAR
2012

BUILDING
"A building more than a century old, once used for industrial production, was revitalized professionally and true to the original, and made self-sufficient in energy by means of ultra-efficient resources derived from renewable sources of energy." (https://nachhaltigwirtschaften.at/resources/sdz_pdf/innovative-gebaeude-in-oesterreich-technical-guide-2017.pdf, 2018-01-12)

Vertical Garden: As part of the revitalization of the building complex the western wall of the warehouse became a vertical garden with 150 different plant species and a total of around 7,000 plants, planned by French botanist and garden architect Patrick Blanc. A plant trail describes the functioning and some of the plants of this green oasis.

Website FRONIUS International GmbH: http://www.fronius.com/en/about-fronius/sustainability

FOTOS

*FRONIUS International GmbH, Photos © FRONIUS*

REGENERATIVE SUSTAINABILITY
(Sources: https://nachhaltigwirtschaften.at/resources/sdz_pdf/innovative-gebaeude-in-oesterreich-technical-guide-2017.pdf; https://nachhaltigwirtschaften.at/en/hdz/projects/first-energy-autonomous-revitalization-of-an-urban-former-industry-quarter-with-the-standard-type-of-passive-house-to-reduce-primary-energy-max-100-kwh-m-sup-2-sup-nfl.php)

**Place:** This project is a renovation of a former industry quarter in the standard type of passive house

**Energy:** Usage of the most modern technologies and locally renewable energy resources. Overall energy consumption reduced by a factor of 10 from its earlier state. Use of local renewable sources of energy (insulation, wind power, geothermal probes).

**Ressources & Carbon:** Increasing the value of the building fabric by comprehensive, energy-efficient renovation – taking the grey energy sunk in the components employed into account. Reduction of CO2 emissions for heating and cooling to 95%.

**Wellbeing:** Significant improvement in the spatial and functional quality of the building, achieved by changing the plan layout. Daylight and artificial light management.

AWARDS / Certificates
Data not available

LINKs
https://nachhaltigwirtschaften.at/en/hdz/projects/first-energy-autonomous-revitalization-of-an-urban-former-industry-quarter-with-the-standard-type-of-passive-house-to-reduce-primary-energy-max-100-kwh-m-sup-2-sup-nfl.php

CONTRIBUTOR
Edeltraud Haselsteiner

NAME
The Rediscovery Centre, The Boiler House

LOCATION
Ballymun Road, Ballymun, County Dublin, Ireland

CLIENT / OWNER
The Rediscovery is a limited company functioning as a non-profit business. Funding obtained from Dublin City Council and selling Rediscovery Centre goods and services. Additional funding and support sought by FAS, Forfas, The Arthur Guinness, Social Entrepreneurs Ireland, Local Agenda 21 and the Vodafone Nature Fund.

PROJECT TEAM
Dublin City Council, The Rediscovery Centre and The European Union Life Programme

THEME / TYPOGRAPHY
HERITAGE, office, industrial

CONSTRUCTION / COMPLETION YEAR
2012

BUILDING
Built in 1966, The Boiler House and its reservoir supplied heating to the Ballymun area. Following regeneration the object of constructing Europe's First 3D Textbook Building at The Rediscovery Centre, was accomplished in 2017. The Rediscovery Centre operates as an interactive, education and creative space linking people, resources and ideas. An onsite café it utilises produce from the roof garden situated on the ceiling of the old reservoir. The existing steel and concrete flooring were preserved. The outer building was completed with recycled brick and cladded with old louvres from the existing Boiler House. Interior glass and insulation for the west wall were sought during regeneration of the Ballymun region.

FOTOS

*The Rediscovery Centre and Boiler House (The Rediscovery Centre, 2017).*

REGENERATIVE SUSTAINABILITY
Numerous sustainable aspects are associated with the building. Designed to achieve maximum solar retention the building too gains its electricity and heat from sustainable and renewable sources. Grey water recycling and rainwater harvesting systems are operational onsite. Compostable toilets contribute to a urinal waste water collection facilitating plant nutrition contained in the internal comfrey wall. Biodiversity is attracted through the installation of a green living wall, green roof and a reed bed structure.

**Place:** This project is a renovation of the former Boiler House, Ballymun, County Dublin

**Energy:** Thermal and PV solar panels were installed into the roof to preserve and produce 80% self-sufficient energy.

**Education:** Waste in the Rediscovery is viewed as an opportunity for reuse and recycling thus support sustainable living within the circular economy. Training courses arising from the four enterprises at the Rediscovery centre include rediscovering paint, cycling, fashion and furniture. Additional environmental education workshops are provided for primary and post primary students' special needs groups, libraries, community adult groups and youth groups.

**Resources & Carbon:** Hemp concrete (mixture of lime and hemp) was used to construct the east and south facing walls facilitating a breathable membrane that conserves heat. An elevated west wall was crafted with a timber frame and insulated using salvaged sheep's wool. The building was painted with recycled paint from the Rediscovery's paint project and local recycling centres.

**Wellbeing:** Biophilic design throughout the building in the form of plants, internal comfrey wall and wood effects enhance the wellbeing and productivity of staff and visitors. Large windows along the top of the building walls in addition to several roof windows, bright colour paint and wood finish and facilitate a natural light throughout the building allow for human thermal comfort regulation for staff and guests. An overall spacious building with designated rooms for each enterprise preventing fumes dispersing, separate offices with desks and workstations at counter height and a purpose built café to congregate has resulted in improved morale and job satisfaction.

AWARDS / Certificates

The Green Non-Governmental Organisation Award 2017 and The Green Construction Award 2017.

LINKs

http://www.rediscoverycentre.ie/about-us/the-boiler-house/

CONTRIBUTOR

Jean Williams

# 06 Circular ECONOMY

AUTHORS
Diana Kopeva, Thomas Panagopoulos, Zeljka Kordej De Villa, Zaneta Stasiskiene, Nikolay Shterev and Milen Baltov

FARO DISCUSSION GROUP CONTRIBUTORS
Daniela Yordanova

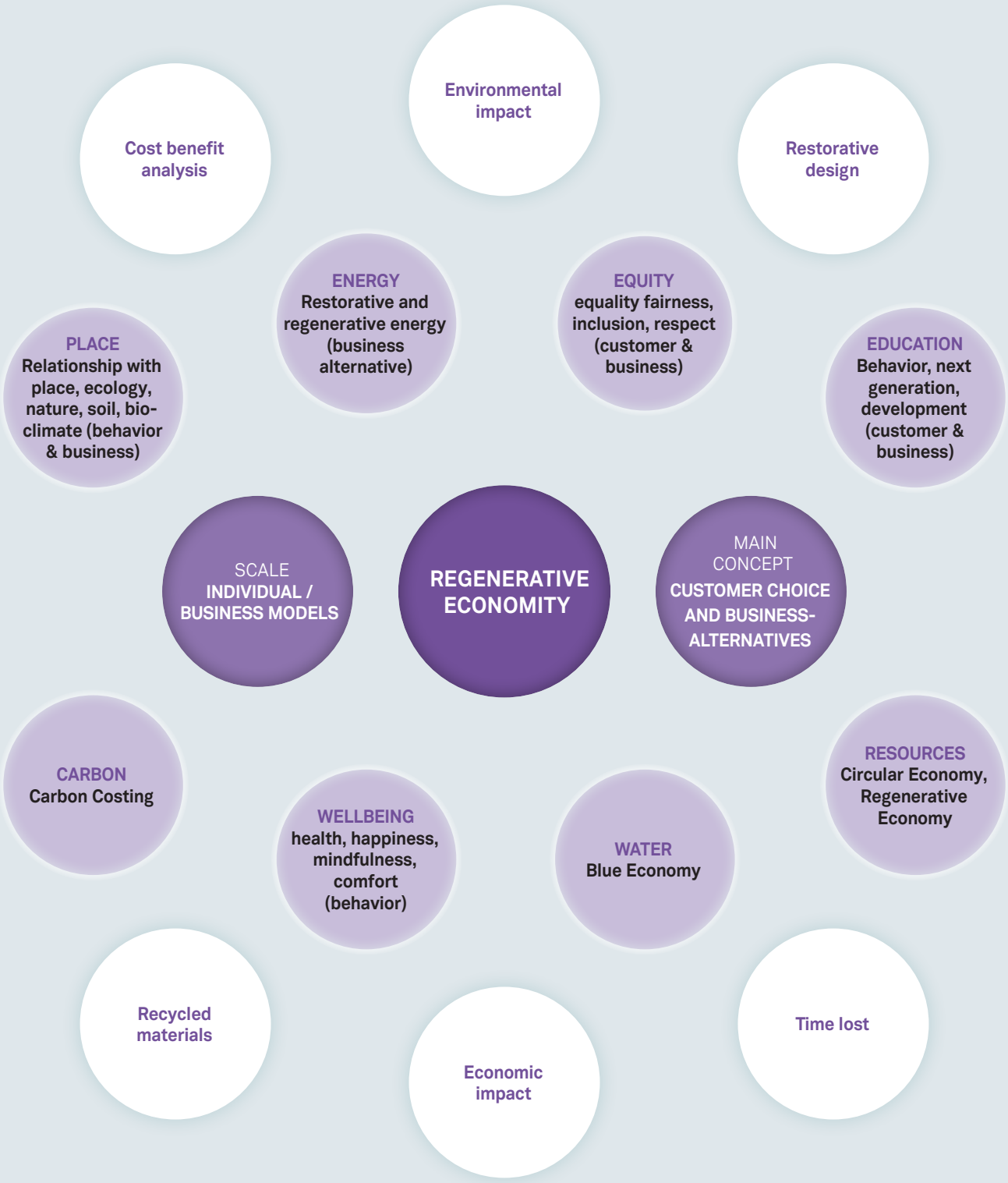



*Figure 10: RESTORATIVE ECONOMY: RESTORE Vision towards a regenerative Future. Main idea, scale, key topics and related concepts. © authors*

# KEY DEFINITIONS

### CIRCULAR ECONOMY.

A circular economy is characterised, more than defined, as an economy that is restorative and regenerative by design. The circular economy is a concept in which growth and prosperity are decoupled from natural resource consumption and ecosystem degradation. By refraining from throwing away used products, components and materials, instead re-routing them into the right value chains, we can create a society with a healthy economy, inspired on and in balance with nature. Circle Economy's '7 elements of the circular economy' stress the combined material and systemic nature of the circular economy, identifying three material pillars:

a. Prioritise regenerative resources,
b. preserve and extend what is already made, and
c. use waste as a resource.

### REGENERATIVE ECONOMY

Reenerative economics is an economic system that works to regenerate capital assets (Kibert, 1999). A capital asset is an asset that provides goods and services that contribute to our well-being. Regenerative Economics focuses on the planet and the goods and services it supplies." While circular economy is an attractive policy which aims to keep products at their highest utility through a positive developing cycle, a regenerative system has to do with rebirth of life itself (Lyle, 1996). It is a principle of ongoing self-renewal process which built relationships and allows socio-economic and ecological systems to constantly evolve.

### BLUE ECONOMY

During the past few years, the term "Blue Economy" or "Blue Growth" has surged into common policy usage, all over the world. For some, Blue Economy means the use of the sea and its resources for sustainable economic development. For others, it simply refers to any economic activity in the maritime sector, whether sustainable or not.

### SHARING ECONOMY

The sharing economy enables a shift away from a culture where consumer's own assets (from cars to drills), toward a culture where consumers share access to assets. This shift is driven by internet peer-to-peer platforms which connect consumers and enable them to make more efficient use of underutilise

### RESTORATIVE ENTERPRISE

Restorative enterprise refers to the ambition an organisation has to do more good for the earth than harm. The term implies the need for people to reverse previous environmental destruction and was most famously used in a speech by Ray Anderson in 1994 where he laid out his ambition to make carpet manufacturer Interface the world's first sustainable company.

# INTRODUCTION

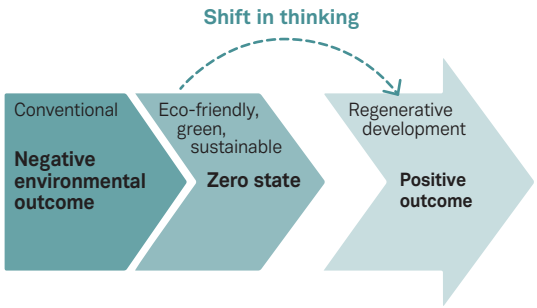
The transition to a circular economy is one of the main priorities of EU policies to help Europe achieve its commitment to achieving the UN's "Sustainable Development Goals". The transition to a circular economy is based on three pillars: environmental benefits, especially in terms of limiting its impact and reducing the use of resources; saving costs from reduced natural resource needs; and the creation of new markets that provide additional economic benefits from circular practices, for example, in terms of job creation or improvement of well-being.

In theory, the circular economy promises significant environmental and economic benefits, and for that reason it should swiftly displace the linea reconomy, but in practice the old model still dominates. The complexity of the concept of circular economy and falling commodity prices are part of the possible explanations for this phenomenon. Circular economy is an extremely complex process with potential impact on the whole economy. Although there are various definitions, it has different impacts on individual economic

sectors and engines. The circular economy has a specific impact on the construction and automotive industry or has a different impact on cities, multi-sector companies or start-ups. Leaders in the private sector and local and national policy makers need more clarity about how exactly the circular economy works and what are the pros and cons for different sectors.
The circular economy concept offers a chance to decouple economic growth from resource consumption. Products are designed and built to be more durable, and to be repaired, refurbished, reused and disassembled. By moving away from the linear model to an ecosystem where natural capital is preserved and enhanced, renewable resources are optimised, waste is prevented and negative externalities are designed out. In an effort to face the needs of our society we have to move from the idea of circular economy towards regenerative economy. While circular economy is an attractive policy which aims to keep products at their highest utility through a positive developing cycle, a regenerative system has to do with rebirth of life itself (Lyle, 1996). Is a principle of ongoing self-renewal process which built relationships and allows socio-economic and ecological systems to constantly evolve.
Regenerative economics is an economic system that works to regenerate capital assets (Kibert, 1999). A capital asset is an asset that provides goods and services that contribute to our well-being. Regenerative Economics focuses on the planet and the goods and services it supplies.
The current system of conventional economic design where we produce, consume and create waste, placing us at the mercy of abrupt climate change and social and ecological collapse. Regenerative systems, through their implicit design, do just the opposite. They recover, restore, and regenerate. In the regenerative sustainability we create synergies that regenerate constantly the natural capital and services. To avoid social, environmental and economic collapse, the world needs to move beyond the standard choices of capitalism or socialism.

## VISION – WHERE WE WANT TO GO!

The transition to a Regenerative Economy is about seeing the world in a different way - a shift to an ecological world view in which nature is the model. The regenerative process that defines thriving, living systems must define the economic system itself. Redesigning our industrial system of production and consumption around the circular and regenerative patterns of resource and energy use observed in mature ecosystems is only one part of redesigning the economy using the insights of ecology (Duque, José & Panagopoulos, Thomas, 2010). To create a truly regenerative economy challenges human society to ask deeper questions and initiate more far-reaching transformative change. A regenerative economy would have “critical value adding exchanges” encouraging people to “discover their essence, innovate, and develop across all sectors and activities of society” (Wahl, 2017). To stimulate participation, people need to feel empowered to contribute to a healthy human economy “negotiating in their own enlightened self-interest as they naturally promote the health of the whole”.




Therefore it can be stated that regenerative development has key differences to conventional development. Ecological health improves rather than degrades, and the placebased, integrative and participatory design methods ensure that significant community health and wellbeing benefits accrue. The potential result is healthier, more resilient and more equitable communities. Another key benefit is the emphasis on understanding local traditions and indigenous knowledge, which can preserve or create cultural identity. Regenerative development would also contribute towards offsetting the on-going negative environmental impact of the existing stock in its transition to better environmental performance. These aspects of regenerative development could mean greater acceptance of new

development by the public and therefore faster transformation of the built environment. In turn, a more adaptable and resilient built environment is a potentially useful strategic response to climate change.

Therefore regenerative development is all about looking at the bigger picture and how whole systems work, rather than focusing on the separate entities. A good way to do this is to:

- Understand the whole system beyond site boundaries.
- Understand and base design on local reality (both ecological and cultural) rather than theory alone.
- Understand and align the human aspirations.
- Understand that the diversity and uniqueness of each place (socially, culturally and environmentally) is crucial to the design.
- Leverage and understand relationships and systems.
- Use multi-disciplinary knowledge and design teams.
- Design to allow complexity and on-going feedback and dialogue processes that allow the development to evolve over long time periods.
- Use integrated and participatory design and construction processes.
- Conserve, restore and regenerate ecosystems. Seek to create or restore the capacity of ecosystems and biogeological cycles to function without human management.

## STATE OF THE ART FOR REGENERATIVE ECONOMY – WHERE WE ARE!

The underlying economic conditions and the need for growth, due to the growing population, have to include environmentally sustainable policies in order to address the problem in accordance with a healthy environment. In an effort to face the needs of our society we have to move from the idea of circular economy towards regenerative economy. While circular economy is an attractive policy which aims to keep products at their highest utility through a positive developing cycle, a regenerative system has to do with rebirth of life itself (Lyle, 1994). Is a principle of ongoing self-renewal process, which built relationships and allows socio-economic and ecological systems to constantly evolve. A regenerative economy depends on renewable energy sources and less materials are required. Contrary to this new type of economy the conventional and green theory focus on economic growth as the only path to wellbeing. Sustainability will become more efficient in a regenerative system. In the regenerative economy theory the aim is to create a stable and healthy system including not only green solutions but also humanistic and ecological values. In figure 11 these steps from conventional to regenerative economy are presented, showing that regeneration goes far beyond sustainability (Fullerton, 2015).

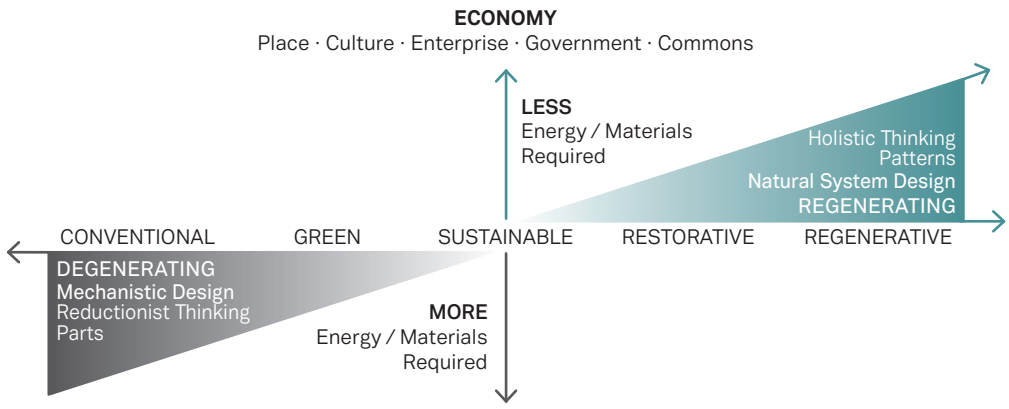



*Figure 11: Stages of development, from conventional to regenerative economy according to Fullerton, (2015).*

Regenerative economics is about an economic system that works to regenerate capital assets. A capital asset is an asset that provides goods and services that contribute to our well-being. Regenerative Economics focuses on the planet and the goods and services it supplies. To avoid social, environmental and economic collapse, the world needs to move beyond the standard choices of capitalism or socialism. The current system of conventional economic design where we produce, consume and create waste, is placing us at the mercy of abrupt climate change and social and ecological collapse. Regenerative systems, through their implicit design, do just the opposite. They recover, restore, and regenerate. In the regenerative sustainability we create synergies that regenerate constantly the natural capital and services. The aim is to reuse the extracted resources, to recycle them in order to reduce the materials required. The main idea is to replace production with sufficiency and to extend the products service life by lessening waste, reusing products that we can, recycling others, repairing the broken ones and remanufacturing the rest (Staher, 2016).

European Commission focuses on Circular Economy (CE) since 2015, with the adoption of an EU Action plan for the Circular Economy. Until 2015 exist separate documents concerning the efficient use of resources, and related to individual sectors. Despite that in the adopted Action plan it is still missing a comprehensive vision and strategy for the implementation of the circular economy, and opportunities for development and growth of economies implementing the principles of CE. Closing the loop – An EU action plan for the Circular Economy (COM (2015) 614 final) (European Commission, 2015) is the European Commission's most current CE policy. Its purpose is to guide the EU states and to transform the economy so as to "generate new and sustainable competitive advantages for Europe." Currently CE is one of the central and key platforms of Horizon 2020. For the last two years EC created a platform for support of Circular Economy with the European Investment Bank (EIB). The platform will link the innovators of investors; publish guidelines for EU countries regarding the production of energy from waste; propose targeted improvement of legislation of certain hazardous substances in electrical and electronic equipment.

With the Plan for investments in Europe, by the end of 2016 were mobilized investments of 164 bln. Euro. The Platform will provide support of circular economy and will improve links between existing instruments such as the European Fund for Strategic Investment (EFSI) and program "InnovFin - EU funding for innovators" on "Horizon 2020", and eventually will develop new instruments for financing projects in this area. Commission, the EIB, national development banks, institutional investors and other interested parties will join forces within the platform. It will raise awareness of opportunities for investment in the circular economy and encourage best practices among project promoters will analyze projects and related financial needs and provide advice on structuring and project profitability.

The state of the art of CE policy on EU level is derived from different sources: (a) official documents of the European Commission (http://ec.europa.eu/environment/circular-economy/index_en.htm), (b) document, materials and papers of NGOs (i.e. the Ellen McArthur Foundation) and (c) academic studies and analysis of CE policy.

Action at EU level will drive investments and create a level playing field, remove obstacles stemming from European legislation or inadequate enforcement, deepen the single market, and ensure favorable conditions for innovation and the involvement of all stakeholders. In order the Action plan to be implemented efficiently a new business model needs to be elaborated and implemented. There are many potential benefits of CE model that can be grouped into economic, environmental, social and resource benefits.

**Recommendations for enhancing the CE model.**

Based on the (EEA, 2016) it was highlighted the following:

1. For the majority of countries, compliance with existing legislation is the main driver of any action taken at the national level. Targets seem particularly effective in energizing policy development and guiding policy implementation.

2. Regional (subnational) initiatives can take advantage of physical proximity, reduced distances and a strong incentive on the part of local stakeholders. When expanding the knowledge base for the circular economy, it is worth keeping an eye on emerging regional and local initiatives.
3. It would be useful to disseminate information on successful initiatives in which the circular economy helps achieve other key policy objectives, such as those related to the climate, competitiveness or employment agendas.

There is a series of critiques concerning the EU's CE model. They suggest that CE model may be scientifically flawed; Second critique originates from the practical problem of optimizing production systems to completely close material loops. In addition EU policy based on CE economic ideas "may create expectations that will never be realized. It sometimes conveys a misconception that there exists an "easy path" to creating a growing economy with an ever decreasing ecological footprint. It may also create the expectation that this can be done on the basis of market forces and voluntary actions only. It neglects the unsolved energy and waste issues that result from its implementation. It could weaken the necessary attention to regulatory issues" (A Review of the European Union's Circular Economy Policy, p. 24)

## GAP ANALYSIS – WHAT WE NEED!

Moving to a circular economy means systemic change. We identified four key enabling factors critical to the development of the circular economy:

- Policy and regulation: Policy and regulation, as well as institutional settings will help to create stimulating environment that encourages direct change.
- Education, awareness and communication: Educational, awareness and communication campaigns and sector networks can provide platforms to exchange information, experiences and best practice.
- Technology and Innovation: Technological progress will accelerate the development of the circular economy. Innovation in product and process design will have positive impact on resource consumption, waste production, etc.
- Collaboration :Delivering the circular economy requires a lot of collaboration, especially at different scale levels. Therefore it's necessary to encourage initiatives at the national and international levels, as well as initiatives at the local and regional levels.

All of these factors are mutually intervening and reinforcing. E.g., policy and regulation set the framework for education and technology, while technology and collaboration provide additional information for policy and regulation in order to implement data driven policy decisions. Finally, these changes could lead to intelligent market incentives and increased financing. Transition to circular economy involves substantial costs in the short-run, but it is also seen as potential for economic renewal.

For optimal outcome and smooth transition to circular economy combination of top-down and bottom-up approach is essential. All scale levels, depending on their responsibilities, should be included in this systemic change (local, regional, national, global), taking into account positive spillovers from one level to another. In addition to macro level, micro level (businesses) is critical. Due to the systemic nature of the change diverse stakeholders should be included – that means public and private sector; state, regional and local policymakers; big businesses and SMEs; NGOs; citizens. Depending on time horizon (short-run or long-run), diverse steps to bridge the gap between state of the art and vision, are available.

There are many different issues relevant for transition to circular economy but here we are dealing with place, energy, water, carbon, resources, education, equity and wellbeing. Roughly, in economic terms we can classify them in economic inputs (place, energy, water, resources, education ) and output (carbon, equity and wellbeing ). Steps for bridging the gap should follow six guidelines of circular economy: regenerate, share, optimise, loop, virtualise and exchange. The following table presents key topics, guiding principles towards circular economy, and short description of gap and possibilities for bridging the gap.

| KEY TOPICS | GUIDING PRINCIPLES TOWARDS CE | GAP AND BRIDGING THE GAP |
|---|---|---|
| Place | "honour place and community"<br><br>"in right relationshi | Public policy should encourage a diversity of unique, collaborative, place-based economies at multiple scales.<br>Circular economy indicator system for monitoring<br>Spatial planning regulations have to comprise the connection with the natural capital policy field. Through urban planning and business park management companies in industrial parks can use another's materials and residual streams.<br>Education curriculum and public awareness and communication campaign that will respect and value place.<br>Data provided by new research agenda will enable innovative place/space management.<br>National spatial strategies should include principles of CE.<br>Whenever possible emphasise replacement of physical with virtual locations |
| Energy | "in right relationship"<br><br>"robust circulatory flow" | The global energy system should replace conventional fuels with renewables.<br>Energy strategies should encompasses "regenerate-share-optimise-loop-exchange" principle.<br>Education program and public campaign should emphasis the issue of energy and acknowledge that conventional fuel threatens the health of the entire system.<br>At the micro level it's necessary to redesign business models from selling products that create waste (cars, heating oil) to providing services in closed-loop models (transportation, warmth).<br>Collaboration can lead to energy unions which is able to utilise economy of scale (e.g. in terms of distribution, etc.) |
| Water | "in right relationship"<br><br>"robust circulatory flow" | Water planning and water policy innovation which will incorporate natural cycles.<br>Responsible water management based on new research agenda<br>New technologies and innovations will decrease water usage.<br>Curriculum and communication campaign that will transform our attitude toward water |
| Resources | "in right relationship"<br><br>"robust circulatory flow"<br><br>"innovative, adaptive, responsive" | Finite resources should be governed by an ethic of thrift, exploiting "Factor Five" resource efficiency potential, and reclaiming, recycling, and remanufacturing as much as possible.<br>Responsible management based on additional data (besides public goods innovative management new business models are required.<br>New technologies and innovations will decrease resource usage |

| KEY TOPICS | GUIDING PRINCIPLES TOWARDS CE | GAP AND BRIDGING THE GAP |
|---|---|---|
| Carbon | "innovative, adaptive, responsive" | Policy planning that would transform economy to low-carbon economy<br>The focus will be in following sectors: power generation, industry, transport, buildings, construction and agriculture<br>Advanced technologies will replace traditional solutions |
| Equity | "empowered participation"<br>"honours community" | Human beings should be treated not merely as substitutable units of labour, but are valued for the unique contributions their creativity and entrepreneurial energies make to the enterprise and to the society at large.<br>Therefore, continuous investment in human capital through education and collaborative learning is essential. |
| Wellbeing | "views wealth holistically"<br>"empowered participation"<br>"honours community" | In keeping with a holistic understanding of true wealth, it is required that the meaning of "capital" includes multiple forms of capital.<br>"Success should be redefined beyond material wealth, power, and fame. Individuals at a deep personal level experience a shift in mindset away from separation and scarcity to one of connectedness and abundance" . |

# LITERATURE / REFERENCES

A Circular Economy in the Netherlands by 2050, Government-wide Programme for a Circular Economy, available at file:///C:/Users/zkordej/Downloads/17037+Circulaire+Economie_EN.PDFBrown, M., 2016. FutuREstorative: Working Towards a New Sustainability. RIBA Publishing.

Brown, P., and Garver, G., 2009, Right relationship: Building a whole earth economy, San Francisco: Berrett-Koehler Publishers. Circle Economy: 5 Questions why the circular economy contributes to climate change mitigation Part 1 - 7 July 2017

Designing Regenerative Cultures, Triarchy Press, 2016.

Ellen MacArthur Foundation, 2017: Cities in the Circular Economy https://www.ellenmacarthurfoundation.org/assets/downloads/publications/Cities-in-the-CE_An-Initial-Exploration.pdf

Hens, L. 2010: The challenge of the sustainable city. Environment Development and Sustainability, 12: 875-876.

JOHN FULLERTON April 2015. REGENERATIVE CAPITALISM How Universal Principles And Patterns Will Shape Our New Economy , http://capitalinstitute.org/wp-content/uploads/2015/04/2015-Regenerative-Capitalism-4-20-15-final.pdf

John Fullerton & Hunter Lovins (2013)

Interface. (2017). What is Restorative Enterprise? | Interface Blog. Available at: http:// blog.interface.com/restorative-is

Reshaping the Built Environment, edited by Charles J. Kibert, Forward by Alex Wilson, Written by Herman E. Daly Copyright 1999, Island Press ISBN 1-55963-701-3, ISBN 1-55963-702-1, Chapter 5 Uneconomic Growth and the Built Environment, In Theory and in Fact. pages 73–88

von Weizsacker, E.U. et al., 2009, Factor Five: Transforming the global economy through 80%improvements in resource productivity, New York: Routledge.

## CASE STUDY 1

### NEW LIFE FOR GLASS: TIKI MOSAIC LTD., MITROVICA, KOSOVO

Recycled glass products have become an important and established consumer niche in architecture and construction, but also important business model for sustainable and restorative economy. The success of curb side glass recycling programs has resulted in more post-consumer glass consumption through development of alternate products that make use of both types of glass (flat industrial glass, and household glass). This helps in many ways sustainability of restorative production at macro, mezo and micro level, as well as: by reducing landfill, by reducing the need for recycled glass storage, and by supporting the economic viability of recycling programs. Million tons of waste glass is being generated annually all over the world. Once the glass becomes a waste it is disposed as landfills, which is unsustainable as this does not decompose in the environment. Glass is principally composed of silica. Use of milled (ground) waste glass could be an important step toward development of sustainable (environmentally friendly, energy-efficient and economical) infrastructure systems.


Example of such restorative business model is a glass recycling and mosaic production factory in Kosovo - TIKI MOSAIC Ltd., located in northern part of the country in Mitrovica, TIKI MOSAIC Ltd. has been opened in 2015 and since then owner and general manager is Faruk Kosumi. Company is a joint Turkish, German and Kosovan investment, and it recycles glass and produces recycled glass mosaics. Since its establishment it triples number of employees, and by the end of 2017 it employees 100 workers

Recycling glass into glass tiles is both environmentally and technically sound. Construction practice reports that the strength and absorption properties of well-made recycled glass tiles is as good as, and often much better than classical tiles. As a rule, recycled glass tiles also save on fossil fuel consumption: typically, less energy is used re-forming glass than on starting tiles from scratch.

TIKI MOSAIC Ltd. is collecting glass from different sources and places around Kosovo. To make glass from recycled glass sources, the raw materials must be free of contaminants (paper, dirt, wrappers, etc.) and must be of uniform source and colour. Typical sources of glass for recycling are bottles, jars or window glass. Different types of glass have different composition and colour; waste glass should be carefully sorted before use. Different manufacturing techniques give rise to different results. The company produces two types of glass tiles that could be used for floor and wall coverage in kitchens and bathrooms: small mosaic tiles (square and round) and large mosaic tiles(rectangle or square ,50mm x 50mm and larger)). Small mosaic tiles could be assembled in tile square sheets. This technique involves small batch sizes and labour-intensive process. One ecological advantage of this technique is that the broken tiles and production waste are kept to a minimum because of the small module of the tile. Larger tile modules create more production waste, and require more color control and quality control. Glass tiles can also be made from cullet (glass that has been crushed and sorted into uniform particles) and placed in ceramic molds. This technique involves heating the glass to relatively low temperatures (800 C) followed by annealing. The advantages include lower firing temperatures and a faster production cycle. The disadvantages are – the colours are dictated by the colour of glass cullet available from the recycling stream, i.e. green, brown or clear bottle glass

## CASE STUDY 2

### THE CONTRIBUTION OF THE CEMENT SECTOR FOR SUSTAINABLE EUROPEAN AND BULGARIAN ECONOMY

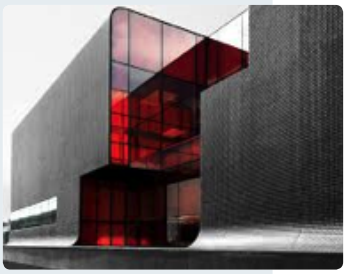
As a part of the Chemical industry, the Cement production sector has flown up under the regulations for reducing the emissions of the productions. So, the Bulgarian enterprises have a strong desire to start over a dialogue with the responsible institutions to follow the last policy requirement for this production.

The importance of the cement industry is measured by the number of employees and the GDP contribution. At the EU level, more than 62 thousand are employed in the sector in 2016th and the total production value (for 2016) is 67 billion euro. The Bulgarian cement industry is less than the European one as more than 1 300 are employed and the total production is 313 million euro for 2016th. Nevertheless, the figures, the growth of the sector is good enough as the growth of turnover of the cement production in Bulgaria is 24% for 2010-2016.

The total investments in the cement industry have significant as their sum for the period 2012-2016 the total investments in the EU are 7 billion euro and in Bulgaria: 250 million euro. Most of them are proven to contribute significantly to CO2 emissions from clinker production and they follow the EU roadmap for fulfillment the highest technology and environmental standards in order to reduce CO2 emissions by 2050th. These investments helped the industry to reduce with 32% of carbon emission comparing to 1990s level and to capture more than 80% of the CO2 emissions.

Following the issues of the EU's policy agenda for greener and renewable economy, the dialogue between Bulgarian cement producers and institutions covers 3 priorities:

- Improvement of the Competitiveness: to find appropriate investment decisions to follow up the environmental protection legislation in order to reduce CO2 emissions as the carbon-capture costs are between 10% and 80% of operating costs of the enterprises.
- Improvement of Resource efficiency: it covers two sub-problems:
  - 1. increase of the usage of alternative fuels by up to 60% (of which 40% biomass) by 2050 as the figures are, respectively 3% of alternative fuels (of which 8.7% is biomass);
  - 2. Reducing the waste as reducing the production. The example is that the finest cement product - the concrete is fully recyclable – and the old concrete could be used instead of cement in new concrete production or in other applications such as road bases, which makes the concrete all part of the circular economy.
- Improvement of energy efficiency in the construction sector: the European Cement Association (CEMBUREAU) together with the Associations of Manufacturers of Precast Concrete and Precast Concrete Producers (ERMCO and BIBM), launched an initiative to inform the society about the friendly environmental production of the cement industry. The PR campaign promoted that the concrete is a safe, functional, durable, cost-effective and environmentally friendly material that could be more often used by architects (example A), engineers, interior (example C), or urban (example B), designers and builders for building houses, schools, hospitals and the infrastructure of the future. It allows saving of 75% of the energy consumption as well as total reduce of other material used for straightening the constructions build-up.



(example A)

(example B)

(example C)

*Figure. 4 Examples of the concrete of the future: building architecture (example A), urban design (example B), interior design (example C)*

## CASE STUDY 3

### BURGAS MUNICIPALITY – THE EU TRANS-BORDER CHALLENGE TO THE URBAN AGENDA

In 2017 Burgas Municipality was promoted by Bulgaria for meeting the messages of the "Pact of Amsterdam". In 2016, the 'Pact of Amsterdam' established the Urban Agenda for the EU and lays out its key principles. At the heart of the Urban Agenda for the EU will be the development of 12 partnerships on 12 identified urban challenges. The partnerships will allow cities, Member States, EU Institutions and stakeholders, such as NGOs and business partners, to work together on an equal basis to find common ways to improve urban areas in the European Union.

In line with the Commission's commitment to Better Regulation, action plans designed by the partnerships will focus on a more effective and coherent implementation of existing EU policies in cities in the fields of environment, transport and employment, for example. It will also focus on easing access to EU funding, promoting combinations of EU funds and enhancing the knowledge base regarding urban matters and the exchange of best practices.

The Municipality of Burgas came in line with one of the Priority Themes, namely the 5th one Circular economy. The objective in front of Burgas is to increase the re-use, repair, refurbishment and recycling of existing materials and products to promote new growth and job opportunities. The focus will be on: waste management (turn a waste into a resource), sharing economy, resource efficiency.

When the Municipality of Burgas considered joining the partnership it already had accumulated experience mostly with the already implied The "zero waste" approach is grounded for circular economy purposes, covering the design and manufacturing stages - retailers - consumer - reuse / repair / recycling - recycling - manufacturing. This requires systematic and parallel work in several directions, first with regard to different types of waste streams and at the same time working with different population groups to change habits and achieve higher and lasting results.

The unique and challenging for the EU is the fact that the Municipality of Burgas builds and works in partnership in a cross-border context with a non-EU neighbour – the Republic of Turkey. Already implemented is the project "Capacity building for the management of biodegradable waste in the cross-border region of Burgas and Kirklareli". As a direct result of the implementation of the project have been purchased home composting systems, and are provided for use by households in 10 settlements in the municipality of Burgas and Kirklareli Municipality.

Considering joining the Urban Agenda for the EU Burgas started to work actively in that part of the circular economy (separate waste collection, recycling and recovery), promotion of repair and artisanal services alongside measures aimed at other elements of the scheme - ecodesign, supply, processing, and also and the financial implications of the measures applied. To further develop the implementation of intelligent accountability and control systems to obtain reliable data and take into account the recycling targets for separately collected paper and cardboard, plastic and metal and the targets for recovery and reduction of deposited quantities of biodegradable waste. The key for Burgas is also the fact that as a maritime city it integrates the circular economy approach with the “blue economy” concept of utilizing the sea resources effectively.

The participation of Burgas in the partnership will enable the city and its businesses to work closely with cities for a sustainable, innovative and economically strong Europe that offers a good quality of life. Burgas is looking at and finding out the role of citizens in promoting the possibility of repairing products and in combating planned aging, encouraging the conversion of waste into resources (secondary raw materials). Since the Commission's package of measures only deals with household waste, which is entirely under the authority and responsibility of local authorities, and because cities have a high concentration of population, quality measures can be considered with regard to waste management.

# 07 Activities WG1

AUTHORS:
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# UK TRAINING SCHOOL

**ORGANISATION /AUTHOR: Martin Brown**

## REVOLUTIONARY, REGENERATIVE SUSTAINABILITY

**The first RESTORE training school was held in Lancaster, UK in November 2017. Designed by WG1 Lead and Training School Director Martin Brown, the school outlined work of working group one and sought to increase attendee awareness of state of the art and emerging thinking for restorative and regenerative sustainability, advocating for a paradigm shift towards a regenerative sustainability for a future built environment.**

*"... teach the student to see the land, to understand what he sees, and anjoy what he understands ..."* Aldo Leopold

@fairsnape
#FuturRestorative

Session One. **Martin Brown,** Fairsnape: Introduction to RESTORE. Defining Sustainability, Restorative Sustainability and Regenerative Sustainability.

Team Work: Can we imagine better standards for buildings?

Session Two – **Edeltraud Haselsteiner:** – Update on working group one sub groups – Social, Buildings, Heritage and Economy.

Session Three. **Ann Vanner**, UCLAN: Restorative Heritage

Session Four. **Emanuele Naboni** KADK: Digital Feedback for Sustainable Futures

Session Five. **Alison Watson,** Class of your Own: Regenerative Education, inspiring the next generation

Team Work: – The Storey through the eyes of a 12 year old  Good Bad and Ugly review against the Living Building Challenge

Session Six **Elizabeth Calabrese:** An introduction to Biophilic and Ecological Design

Session Seven. **Joe Clancy:** The 14 patterns of biophilic design

Teamwork: Cuerdon Valley Park Visitor Center through the 14 Patterns lens.

Session Eight. **Amanda Sturgeon:** Biophilic Design and the Living Building Challenge (webinar)

Session Nine. **Jenni Barrett (UCLAN):** Landscaping for Regenerative Sustainability.

Teamwork and Team presentations: Lessons learnt and action planning.

Session Nine. **Paul Clarke,** Naturally Smart; Are Living building sentient? Facilitated discussion

Site Visit: Brockholes Visitor Center, Preston. Buildings relationship with place and nature.

Session Ten. **Ann Parker:** Mindfulness for Sustainability

Site Visit: Cuerdon Valley Park Visitor Center. UK First LBC project with **Simon Thorpe.**

Team activity: Tree planting for future resource and carbon offset.

Session Eleven. **Barbara Jones,** Straw Works: Designing for the Living Building Challenge

*"I believe this was the beginning of something bigger and totally revolutionary"*
Trainee Report Feedback

# SHORT TERM SCIENTIFIC MISSIONS (STSMS)

NAME: Edeltraud Haselsteiner
DATES: 07-02-2018 to 27-02-2018
HOST: University of Auckland, School of Architecture and Planning, New Zealand

## TITLE: **Influencing factors & frameworks for Restorative Sustainability**

**STSM Recipient:** Edeltraud Haselsteiner: key senior researcher, project management and consultancy within the fields of sustainable architecture and sustainable urban planning; lecturer with study program on renewable urban energy systems, course on sustainable urban architecture; initiating and managing research projects in interdisciplinary fields of architecture, urban planning, gender and sociology.

### Description of Objectives & Results:

> *"Sustainable buildings and facilities are critical to a future that is socially just, ecologically restorative, culturally rich and economically viable within the climate change context. Despite of over a decade of strategies and programmes, progress on built environment sustainability fails to address these key issues."* (RESTORE)

The COST action RESTORE identifies several reasons why the goals are missed. Among others, inadequate measures in the building standards, which have only a less bad than usual aim, are recognized as a key factor. In order to exceed this limit, a comprehensive analysis of influencing factors and framework conditions is required. It is important to overcome the conventional narrow focus on the energy performance and to pursue a broader vision, as to which the built environment is (re-)connected with nature, embedded into the location with the on-site infrastructure and resources, or planned with the awareness of the diversity and needs of the people. Having addressed technical or energy-performative matters in the past, it is clearly necessary now to identify a wider range of aspects and raise awareness concerning human needs.

The main objective of this short term scientific mission is to identify key factors and research gaps related to Restorative Sustainability. The STSM intends to foster collaboration between the EU COST country and the international partner, to deepen knowledge related to relevant research fields in working group one. In this context concepts, defined indicators and frameworks for Restorative Sustainability have to be explored, focusing on key themes of working group one, especially on the intersection of social aspects (i. e. equality and diversity, resilience) and technology, as well as on global sustainability goals.

The work is based on the ongoing discussion and elaboration of Restorative Sustainability in Working-group one. During the first meeting in Faro (May 30-31, 2017) main issues have been defined more concisely and four sub-areas of action (Social – Heritage – New Buildings – Economy) have been discussed. The aim is to combine these results into a systemic approach where "knowledge, skills, and competence that should inform and orient the practice shift required by an approach to architecture informed by restorative sustainability" (RESTORE). The STSM will take up the results of this workshop and its further processing (discussion papers, training school). Subsequently it will reflect the different approaches with additional inputs, experiences and best-practice examples of the Host institution.

In the long term, the publication of a joint article is planned; research co-operation and scientific cooperation will be intensified; joint research proposals are intended

NAME: Lisanne Havinga
DATES: 18-07-2017 to 29-08-2017 and 1-11-2017 11-11-2017
HOST: EURAC, Institute for Renewable Energy, Italy

## TITLE: **The Use of Life Cycle Assessment in the Design Process of Restorative Heritage Refurbishment**

**STSM Recipient:** Lisanne Havinga is a doctoral candidate at Eindhoven University of Technology in the Netherlands. The topic of her PhD is the integration of Heritage Significance & Impact Assessment, Life Cycle Assessment (LCA), Hygrothermal Performance & Risk Assessment and Life Cycle Costing in the evaluation of design decisions on the sustainable refurbishment of post-war dwellings.

### Description of Objectives & Results:

The STSM is focussed on the use of Life Cycle Assessment (LCA) as a tool to guide the restorative design process. The STSM would contribute to the analysis of the state-of-the-art with respect to Whole Building Life Cycle Assessment, and would identify limitations and challenges found in the application of this tool in a restorative refurbishment design process. The objectives include:

1. Conduct a review on the extent to which LCA is used as a method to assess sustainable (heritage) refurbishment designs
2. Conduct a comparison of different LCA methods and databases and their availability in LCA software
3. Conduct LCA on heritage refurbishment design options of the first case study and optimizing the refurbishment design to achieve a restorative building.
4. Identify the main challenges and opportunities found in the integration of LCA in a refurbishment design process.
5. Identify the main challenges in achieving a restorative post-war heritage refurbishment.

### The results of the STSM include:

**A literature review describing:** 1) The use of whole building LCA, which is mainly focused on the new construction of 'exemplary' buildings and almost never on refurbishment. Moreover, it is almost always an evaluation of the whole buildings as a finished product, and hardly ever as an evaluation of design decisions. 2) The use of LCA on building products, which has a much larger body of literature than whole building LCA. For every building group identifying key publications and key considerations. 3) Relevant standards in relation to LCA, and recent developments in the alignment and availability of LCA data. 4) Available databases and the main considerations concerning reliability and deviation of these databases.

**A methodology chapter describing:** 1) The iterative LCA process as a methodology. 2) The different databases and arguing the choice of the use of specific databases. 3) The different LCIA methods and arguing the choice of the use of a specific LCIA method. 4) The different LCA software and arguing the choice of the use of a specific LCA software. 5) The scope and limitations of the assessment. 6) The way LCA was integrated in the design process, both in the overall design, as well as in partial design decisions.

Other results are 'interim' results, which still need to be further developed. They include the tests of the software integration in a BIM model and Energy Model, and the first results of these evaluations. All of the results will be published in a journal paper as part of the PhD thesis.

STSM REFERENCE: CA16114 - 38316

BENEFICIARY: Krzysztof Herman, assistant professor, Landscape Art Department, Warsaw University of Life Sciences, Poland

HOST: Thomas Panagopoulos, Research Center on Spatial Dynamics (CIEO)

PERIOD: [01-10-2017 to 01-11-2017]

PLACE: University of Algarve, Faro, Portugal

## TITLE: **Traces of upcycling and low-budget design in the public space of Faro**

**STSM Recipient:** Krzysztof Herman is a landscape architect working at the Department of Landscape Art at Warsaw University of Life Sciences. His fields of expertise are: landscape architecture and art, placemaking, temporary and low-budget strategies in urban design, social participation in design process. He was awarded several international research grants (Fulbright at Harvard GSD, COST STSM at University of Algarve) and short teaching grants (Turkey, Serbia).

### The objective of the research is to:

1. Through a literature review characterize upcycling and low-budget design as a strategy for restorative sustainability.
2. Document and systematize traces of upcycling and low-budget design in the public space of Faro.
3. Connect and analyze findings from both literature and field study in order to establish the state of the art for Restorative Sustainability in regard to upcycling and low budget design strategies.

### Abstract description:

Frugality is a core notion of sustainability, responsible resource management should be prioritized in urban planning and landscape architecture. Low-budget strategies as a deliberate mean of creating valuable, attractive, well-used, sociable public spaces are recognized by some influential designers including Project for Public Spaces in their “Light, cheap, quick” methodology. Unused spaces, just like objects and waste, can be creatively changed, reinvented with little resource input through a circular solution of upcycling.

Case study methodology is predominantly used in the inquiry with three new parks, built after the year 2004, in Faro, Portugal as the central cases. The study examines how success rate and the current state of these public green areas correlates with the amount of financial resources invested in each of the projects. The case studies show key aspects in the building of the three spaces such as urban context, management and community participation. The success rate of place is established on the basis of user activity observations, user counts and questionnaires – both conveyed amongst experts and local residents. Results illustrate how low-budget strategies and limited use of funds and resources can be translated into a successful project of a public greenery. Comparative studies (examples from cities like Warsaw, Berlin and Detroit) further extend the discussion to the notion of upcycling as a sustainable solution for landscape architecture.


*Fig. 1* *At the gate of the Gambelas Campus, University of Algarve*

*Fig. 2* *Wooden walkway above the fragile landscape of Ria Formosa nature park*

NAME: Madalina Sbarcea

AFFILIATION: *Danube Delta National Institute for Research and Development, Tulcea, RO
*Ion Mincu University of Architecture and Urbanism, Bucharest, RO

DATES: 11-09-2017 to 13-10-2017

HOST: Thomas Panagopoulos, University of Algarve, PT

## TITLE: **A Biophilic Mindset for Restorative Buildings**

**STSM Recipient:** Madalina Sbarcea is a researcher at Danube Delta National Institute for Research and Development (focusing on the built environment in natural protected areas, urban and territorial complex systems, sustainability and regional development) and a PhD student in Urban and Territorial Planning at Ion Mincu University of Architecture and Urbanism.

### Description of Objectives & Results:

The STSM was focused on the occurring paradigm shift regarding the concept of sustainability of the built environment: from reducing the impact on the environment (low impact buildings) to contributing to the restoration of the socio-ecological systems (a restorative built environment).

### The STSM addressed the following questions:

1. What is the state-of-the-art in the research that links biophilic design theory and practice to the restorative function of the built environment? What are the emerging trends?
2. How is biophilic design evidence linked with practices that promote / encourage / acknowledge sustainable buildings?
3. What are the gaps, challenges and opportunities for making the transition from neutral/ low-impact to net-positive/restorative buildings through biophilic design?

In order to attempt some answers to these questions, the work carried at the host institution included:

- A literature review on the restorative functions of the built environment designed based on biophilic principles
- Determining and assessing the "sustainability" defined by important influencers of the development of the built environment, such as:
  - Certification standards for sustainable buildings – a brief comparison of philosophy, tools and methodology for certifying a building as sustainable
  - Recognized best practice (e.g., important architecture awards - perspectives/review of criteria for acknowledging important contributions to humanity and the built environment, influencing the development of the built environment by providing inspiration/model for future, young and established professionals)

The initial plan was enriched through field trips and other activities organised by the STSM coordinator that facilitated the visitor's understanding of the local context of the host area.

The first dissemination of the STSM results will be made through the collaborative paper that was submitted to the Urban Growth 2018 Conference, organised by University of Alicante, Spain and Wessex Institute, UK, in Alicante between 8-10 May 2018.

Furthermore, a joint project proposal is envisaged to be developed in 2018 by host-visitor institutions and submitted under the Horizon 2020 Societal Challenge: "Climate Action, Environment, Resource Efficiency and Raw Materials".

# 08 Epilogue

AUTHORS
Martin Brown and Edeltraud Haselsteiner

Within this publication we have sought to describe and reinforce a new era of sustainability, one that address the impacts, pressures and challenges of our Anthropocene age. Against the background of and within the context of rapidly changing climate we longer have the luxury not to seek a new sustainability. A new sustainability paradigm that moves away from just reducing impact to one that is committed to doing more goods, through focused restorative and regenerative strategies and actions.

We have sought establish a language of regenerative sustainability, one that includes love, place and participation in addition to regenerative approaches to energy, water and resources

The rise in wellness as an element of sustainability is highly significant with many of the main stream standards now evolving to embrace wellness, align ing for example with the Well Build standard, or as in the case of the Living Building Challenge recognising the importance of buildings on the happiness of its inhabitants. We can go much further however with, buildings that provide salotogenetic benefits, improving the mental and physical health of those who work, play and live within our buildings, and in doing so making a significant contribution to wider health care economies.

Through the work on definitions, social aspects of sustainability, living buildings, heritage and economy, we have identified and explored a number of 'triggers' necessary to move us to a future built environment that is ecologically sound, culturally rich, socially just and economically viable.

- Language – a language for sustainability that inspires, not confuses,
- Education – inspiring the next generation
- Nature – reconnecting buildings with nature that in turn can reconnect people with nature
- Place – living buildings that contribute to and enhance stories and culture of the past and share lessons for the future.
- Economy – moving from limited growth to Regenerative Economies

The working group one definitions, insights, visions and triggers to move us towards a regenerative economy now sets the foundations;

- for future RESTORE working groups to build upon and to develop,
- for industry to adopt and implement through adopting regenerative frameworks and standards
- identified (such as the Sustainable Development Goals and the Living Building Challenge) and
- for education and academia to embrace and include within built environment curriculums.

The built environment is currently a major contribution to climate change, the task before us is to make the shift towards a future build environment that makes a responsible contribution to climate solutions.

Welcome to a new era for sustainability

Martin Brown
Edeltraud Haselsteiner

# 09 People

# PEOPLE (AUTHORS, CONTRIBUTORS)

**Diana Apró,** architect and researcher, works as an expert and consultant in sustainable urban development and energy efficient building design at ABUD – Advanced Building and Urban Design, Budapest, Hungary.

Diana earned a second MSc. degree in Resource Efficiency in Architecture and Planning at the HafenCity University Hamburg. Her main fields of interest are urban microclimate analysis and the assessment, benchmarking and development of smart cities. She has been involved as a consultant and coordinator in EU projects. She is a co-author of several publications on energy efficient refurbishment of historical heritage buildings (2015) and on smart city tools supporting regenerative and resilient urban environments (2016).

**Milen Baltov** is a professor and vice rector of Burgas Free University, Burgas, Bulgaria.

His research interests are in the field of entrepreneurship, organizational behavior, regional development, innovations. He is author of more than 100 publications in national and international journals, member of scientific committees and Steering Committees in the area of entrepreneurship.

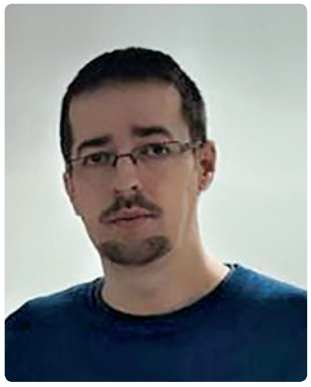
**Ana Paula Barreira** is a researcher at CEFAGE – Centre for Advanced Studies in Management and Economics, University of Algarve. Ph.D. in Economics, Assistant Professor at the University of Algarve. Responsible for the project: “Policy guidelines for the regeneration in shrinking cities", granted by (Portuguese) FCT.

She is the author of a chapter in New Dimensions in Community Well-Being (Springer 2017) and in Towns in a Rural World (Ashgate Publishing 2013). She has recently published articles addressing public policies in journal such as Growth and Change (2017), Urban Research and Practice (2017), European Planning Studies (2016), Policy Studies (2016), Cities (2016), and Built Environment (2012). She lectures Political Economy, Monetary Economics and Public and Financial Economics.

**Martin Brown** is Vice Chair of RESTORE with over 40 years' experience within the built environment sector, in project management, businesses improvements and independent sustainability consultancy within the UK and internationally.

Martin is a 'Sustainability Provocateur' founder of Fairsnape, based within the Forest of Bowland, Lancashire UK and committed to enabling success within client, design and contracting organisations with a focus on sustainability, collaborative working, and corporate social responsibility. Martin is a respected expert and advocate of sustainability innovation, with an interest in all that can help bring about a healthy regenerative future.

Martins latest book, 'FutuREstorative - Working Towards a New Sustainability' furthers the debate on new sustainability thinking within the built environment, Martin pulls on a lifetime of outdoor related activity, his built environment project management career and environmentalist thinking to reinforce the importance of a deeper connection with the natural environment, advocating mindfulness, biophilic and salutogenic design for a healthy future.



**Dr. Haris Gekic** is Assistant Professor of Human Geography at Department of Geography, Faculty of Science, University of Sarajevo.

Dr. Haris Gekic is Assistant Professor of Human Geography at Department of Geography, Faculty of Science, University of Sarajevo. The author or coauthor of three books and more than 20 scientific articles. His research interests include urban and rural geography, spatial planning and population geography. He is member of the Council for urban planning and aesthetic design of the City of Sarajevo.

**Edeltraud Haselsteiner,** Vienna University of Technology, Faculty of Architecture and Planning, Austria, edeltraud.haselsteiner@aon.at

Edeltraud Haselsteiner, Project manager, Consultant and Senior Researcher within the fields of Sustainable Architecture and Sustainable Urban Planning in Vienna, Austria; Managing interdisciplinary research cooperations with focuses on sustainable urban planning, mobility, participation, aging society, sociology, gender and art. Key Senior Researcher and Lecturer at the Institute for Social Ecology (Alpen-Adria University Klagenfurt-Wien-Graz), at the University of Applied Sciences Technikum Wien (Master program Renewable Urban Energy Systems) and at the Vienna University of Technology (Institute of Urban Design and Landscape Architecture).

# PEOPLE (AUTHORS, CONTRIBUTORS)

**Diana Kopeva** is a full time professor at Business Faculty, University of National and World Economy, and freelance consultant in the field of environmental economics and sustainable development.

She gives lectures on Strategic management, Entrepreneurship and Business Planning. She is one of the leading researchers in the area of environmental economics in Bulgaria. Her research interests are in the field of entrepreneurship, circular economy and sustainable development. She participated in numerous projects (national and international) focused on business behavior, motivation and business performance of entrepreneurs in transition from linear to circular economy.

**Željka Kordej-De Villa** is a highly experienced researcher in the field of environmental economics and environmental policy.

She is senior research fellow at the Institute of Economics, Zagreb, where she started her professional career in 1987. Her main research interests are environmental economics and economics of natural resources, local economic development, regional and urban economics and public policies. She is primarily engaged in the applied research in the field of environmental, regional and urban economics, and in policy-oriented studies and research-based consulting projects. Her project experience includes advising Ministry of Environmental and Nature Protection, Ministry of Regional Development and EU funds, Croatian Environment Agency, Croatian Waters, etc. Since 1998 she has been member of Croatian section of ERSA (European Regional Science Association). She holds a Ph.D. degree in economics from The University of Zagreb, the Faculty of Economics, Zagreb.

**Egla Luca;** Polis University – Faculty of Architecture and Design / Department of Engineering and Architecture, Tirana, Albania.
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PhD. Egla Luca, lecturer at POLIS University. Egla has earned the title PhD. In the Double degree program between Ferrara University and POLIS University IDAUP “The reuse of Albanian Industrial Archeology as an approach to sustainability and conservation. Research on the new evidences of expression of the former industrial buildings with the implication of 3R; Retrofit, Re-Use, Revitalize”, 2013-2016. Her Master of Science in “Structural Design” is earned from the Polytechnic University of Tirana / Faculty of Civil Engineering. Despit e her academic activity, Egla Luca is very active also in the field of structural end energetic design and collaborates closely

with the design office “Metropolis” but not only. She is part of many international projects such as DAPEEWEB and CONSUS, projects supported by the EU. Egla has a number of national and international publications in the field of “Seismic Vulnerability Assessment”, “Industrial Archeology in Albania”, “Energy Performance of the building stock” and “Structural Retrofit”. Lately she just finished the translation of “Seismic Design for Architect – outwitting the quake” by Andrew Charleson.

**Thomas Panagopoulos** is a full time professor at the University of Algarve, Faro, Portugal.

His main research fields are “landscape reclamation”, “landscape architecture” and “sustainable development”. Has been Department Head and Landscape Architecture Master Degree Director at the University of Algarve, Portugal and at the Doctoral Program “Innovation and Land Management”. He was founding member and Vice -president of the Centre of Spatial Research and Organizations at the University of Algarve. Member of Editorial board of various scientific journals. Lecturer of various Universities and Research Organizations, and author of more than 250 publications. He organized 15 International conferences related to Landscape Architecture, Information and Technology, Urban Development, Environment and Sustainability. Hes coordinator or participant at various EU financed projects and national research projects.

**Katri-Liisa Pulkkinen,** architect and researcher, works at Department of Built environment at Aalto University School of Engineering, Finland.

In her forthcoming doctoral dissertation, she discusses how the emergent bottom-up action towards regenerative sustainability could be identified and supported. She engages in development of research, teaching, communication and cooperation in the field of regenerative sustainability, both in academia and in practice. Her scientific interests include transitions and transformations towards regenerative sustainability, applications of systems thinking in sustainability and in community development, and emergence and resilience of systems.

**Blerta Vula Rizvanolli,** is an architect and researcher who works at Department of Architecture in the University for Business and Technology in Pristina, Kosovo.

She also works as a consultant for World Bank and EU projects with a special attention in Construction and Energy Management. She holds a Master of Science Degree in Architecture and Project Management and actually is working to finalize her MBA from University of Sheffield. She is also certified by International Project Management Association. She is a co-author of several publications on Circular Economy (2017), Complex Adaptive Leadership in Multinational Construction Industry (2017), Innovative Information Systems in Construction Industry (2016), Buildings Performance (2016), Urban Sense of Community (2015), etc.

**Angel Stankov Sarov is** a chief assistant professor at the Department "Economics and Management of Agricultural Holdings" of the Institute of Agricultural Economics, Sofia, Bulgaria.

He holds a Ph.D., a M.Sc. and a degree (5 years studies) from the Department of Agricultural Economics of the University of National and World Economy (UNWE), Sofia. The main scientific interests are in Agricultural Cooperatives, Entrepreneurship, Governance and Governance Structures, Sustainability management, Evaluation and effectiveness of collective action, CRM, Institutional analysis and Econometrics methods. Dr. Sarov is a member of the European Association of Agricultural Economists (EAAE).

**Prof. dr. Žaneta Stasiškienė**
Director of the Institute of Environmental Engineering Kaunas University of Technology (KUT).

Her experience under UNEP DTIE was transferred to Zimbabwe, Vietnam, Tanzania, Russia and covers areas of Sustainability assessment, sustainable innovation and development of environmental project financing schemes, infrastructure activity plans for Central and Eastern Europe, South-East Africa, Asia Countries. She is the leader of the Research Group on Sustainable Cities at KUT, Senior Researcher and Developer of tools and methodologies for Industrial Sustainability Assessment, Environmental Risk Management and Environmental Performance improvement in industry, Development and Implementation of Sustainable Business models. Also Zaneta is the Leader of scientific group "Smart and sustainable cities" at Kaunas University of Technology (since 2015).

**Prof. Dr. Nikolay Shterev** is full time professor in the University of National and World Economy - Sofia, Bulgaria.

He works in UNWE from 2000. He has been a Head of Industrial Business Department since 2016. As the main science field of his work is economics and management the Expertise fields are: industrial business behavior, marketing actors and market behavior, enterprise economics, industrial economics. Thus, research area covers different EU, national and university projects that cover main issues of: industrial growth, sustainability and competitiveness (on enterprise level), social business networking. The latest publications cover the next items: Modelling Social Business Networks' Economic Behavior; Measuring The Regenerative Growth CSR in Bulgaria: perspectives and possibilities; Regenerative Economy and Measuring the Regenerative Growth, Multidimensional Framework for Cross- corporate Business Social Network (BSN); Framework for Establishment a Cross- corporate Business Social Network (BSN).

**Ivan Sulc;** University of Zagreb, Faculty of Science, Department of Geography, isulc@geog.pmf.hr

Ivan Šulc was born in 1987 in Zagreb. In 2011 he finished master's course in geography Heritage and Tourism at the University of Zagreb and in 2016 he defended his doctoral thesis Models of Tourism Development in South Dalmatia at the same university. He works as postdoctoral researcher at the University of Zagreb, Faculty of Science, Department of Geography and currently he is assistant at courses Geoinformatics, Cartographic Basis of GIS, Tourism Geography, Regionalization Principles and Geography of East Asia. He spent five months at the University of Milano, Italy at the Erasmus+ Placement in the academic year 2014-2015.

His research interests are related to sustainable tourism and GIS. He collaborated at 12 research and other projects related to impacts of tourism and second homes on the territory, introducing elective GIS courses in high school education and strategical planning of the City of Zagreb. At the moment he is MC member at the COST action CA16114 Rethinking sustainability towards regenerative economy (RESTORE). He participated at more than 15 scientific conferences and published 8 papers. He is author of the manual Digital Cartography aimed for the high school students studying GIS. He is secretary of the scientific journal Croatian Geographical Bulletin and member of the steering committee of the Croatian Geographical Society. Ivan Šulc is team leader of the Croatian team at the International Geography Olympiad. More information is available at: http://www.pmf.unizg.hr/geog/ivan.sulc.

**Szabina Várnagy,** architect, works as an energy efficient building design consultant at ABUD – Advanced Building and Urban Design, Budapest, Hungary.

She is mainly responsible for the management of WELL Building certification projects. She has been involved in several historic building surveys, the refurbishment of an industrial heritage building, and design process within the BIM environment. She is a co-author of an article addressing the methodology of 3D laser scanning in the conservation of cultural heritage (2016).

**Dr. Zvi Weinstein** is an urban planner specializing in urban regeneration among disadvantaged neighbourhoods. He is teaching at the Tel Aviv university the Urban Design Lab; Co-Founder of the Israel Smart City Institute. Member at several EU-COST Actions – Citizen Science, Cyber Parks, Environmental Citizen Science and RESTORE; Founder of Youth Build Organization in Israel.

Weinstein's field of interests include: Aspect of social and human behaviour; Citizen participation; How to humanize technology; Citizen science roles in smart cities.

**Jean Williams** is a graduate student of the University College Dublin Innovation Academy.

Her educational achievements include a Masters (Hons) in Geography, a Graduate Certificate in Sustainable Agriculture and Rural Development and a Bachelor of Arts in History, and Geography (Hons), from University College Dublin. Her research interests focus primarily in Environmental Geography and more particularly on sustainability, climate change and green infrastructure. Jean has co-authored a paper termed 'The green 'signature' of Irish cities: An examination of the ecosystem services provided by trees using iTree Canopy software', published in the academic journal Irish Geography in 2015. Continuing on from this paper Jean has researched Green Infrastructure in Galway City. Jean is a member of the Sharecity project reading group at Trinity College Dublin. A 2017 European Union Cost RESTORE scholarship recipient, Jean attended a Training School in Lancaster on Sustainability, Biophilia and Sustainable Education.

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