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BEYOND SUSTAINABILITY: REGENERATIVE ECONOMY PRINCIPLES AND BUSINESS PRACTICE

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Abstract: *Based on the results of CROSS-REIS training session on "Building capacities and the knowledge base for regenerative economy stewardship", held at EMEA, in Barcelona, on October 30th 2024, the paper offers an overview of regenerative economy definitions and principles, with an excursus through the concepts of net-positive business, how regeneration differs from sustainability and circularity paradigms, system value creation, regenerative finance, the delivery of better growth, and the application of flow network theory principles to characterize Regenerative Innovation eco-Systems (REIS). future research directions are suggested to build up regenerative innovation living labs engaging citizens, experts and decision makers in different regions of Europe, aiming to raise awareness on the regenerative economy challenges and opportunities and assess if present and future quality of life is enough for all living beings – i.e. the aim of regenerative economy transition.*

Keywords: *Regeneration, Net-Positive, Regenerative Finance, Flow Network, Territorial Quality of Life.*

1. Introduction

The *Cross-disciplinary Network for Research Excellence in Regenerative Economy Innovation Eco-Systems (CROSS-REIS)*[2] is committed to advancing knowledge and research that fosters regenerative economies. Regenerative economies are built upon principles that not only sustain but restore and revitalize natural ecosystems and societal wellbeing. In this context, CROSS-REIS brings together researchers, policymakers, and practitioners from across Europe and the Mediterranean region to engage in collaborative efforts to enhance research capacities and develop innovative solutions.

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[2] https://crossreis.com/

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2. Regenerative economy: a new business paradigm

The goal of sustainability has been to meet the needs of present generations without compromising the ability of future generations to meet their own needs. However, the prevalence of a linear and degenerative economy has weakened the planet's regenerative capacity, making it increasingly hard to achieve this ambition. Sustainability has become a necessary but insufficient condition for long-term human welfare. Next to sustaining, there is a growing need to regenerate our and the planet's ability to meet present and future needs. This has given rise to the field and idea of **regeneration**. The term essentially refers to the *ability of a system to remake or renew itself continuously*, and it has its origins in biology and natural sciences, relating to the ability of cells, organisms and ecosystems to renew themselves. As a process it is essential to biological systems and describes their capacity to bring themselves again into existence.

The starting point for regenerative thinking is the realization that humans are fundamentally dependent on nature. We are indeed in a situation where rapid change to a healthy relationship with the planet is in order. Nowadays, the concept of "regeneration" and "regenerative economy" moves our frame of discourse from "doing things to nature" to "participate as partners with and as nature".

By taking a regenerative worldview, we radically change the concept of sustainability. The question in *sustainable development* was "How can the economy work in such a way that we sustain or do not hurt the underlying ecological and social support systems?" Now, the question in *regenerative development* becomes "How can the economy work in such a way that we improve the capacity of the underlying support systems?"

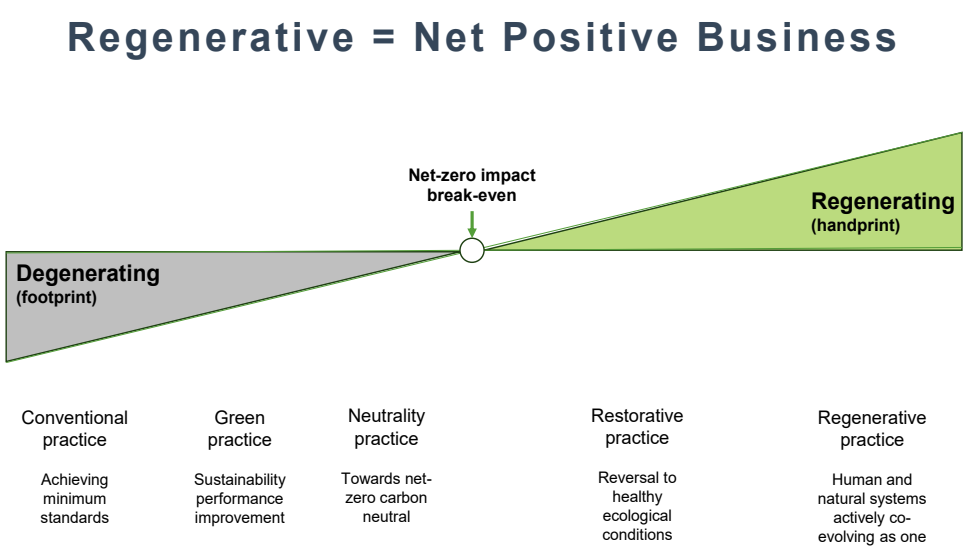
2.1. Regenerative economy: foundational concepts

Regenerative organizations take a more holistic view of their business practices and aim to regenerate the natural and societal spaces in which they operate, promoting the self-renewable capacity of natural systems that have been damaged or overexploited, through a co-evolutionary process, where organizations align their

activities with the living systems that surround them. Their business model asks to deliver a **net positive environmental and social impact**, which is achieved when the benefits created by an organization's product or service (*handprint*) are bigger than the negative impact that this same product or service creates along its life cycle (*footprint*).

In practice, "regenerative" and "net positive" can be considered equivalent attributes: for a business to qualify as regenerative it is no longer enough not to do harm by neutralizing its own impact on the environment and society (*net-zero*), it needs to do good by delivering an eventually positive impact (*beyond net-zero*), as illustrated in Figure 1 below.

Figure 1 – Shifting towards regenerative practices



The figure shows the whole span of conventional (not sustainable), sustainable (green and net-zero carbon neutral), restorative (of good ecological conditions) and regenerative (of whole socio-ecological systems) practices, which cause a shift from degenerating (negative footprint) to regenerating (positive handprint) impacts on the environment and society.

Polman & Winston advocate net positive business as a form of sustainable capitalism that "improves for everyone it impacts and at all scales – every product, every operation, every region and country, and for every stakeholder, including employees, suppliers, communities, costumers, and even future generation and the planet itself" (Polman, P., Winston A., 2022, p.7).

This claim for a "wider purpose" driven business is not new. In the year 2019, just before the COVID 19 pandemic, the World Economic Forum (WEF) Davos Manifesto declared that "A company serves society…support communities…pays its fair share of taxes…act as a steward of the environment…consciously protects our biosphere and champions a circular, shared and regenerative economy".

These are still the guiding principles for a regenerative and net positive business. Frameworks like the Stockholm Resilience Centre's work on planetary boundaries (Rockström, J., 2009), economist Kate Raworth's Doughnut Economics (Raworth, K., 2017) and Bob Willard's Future Fit (Future-Fit Foundation (2019) all offer important perspectives towards a regenerative economy horizon.

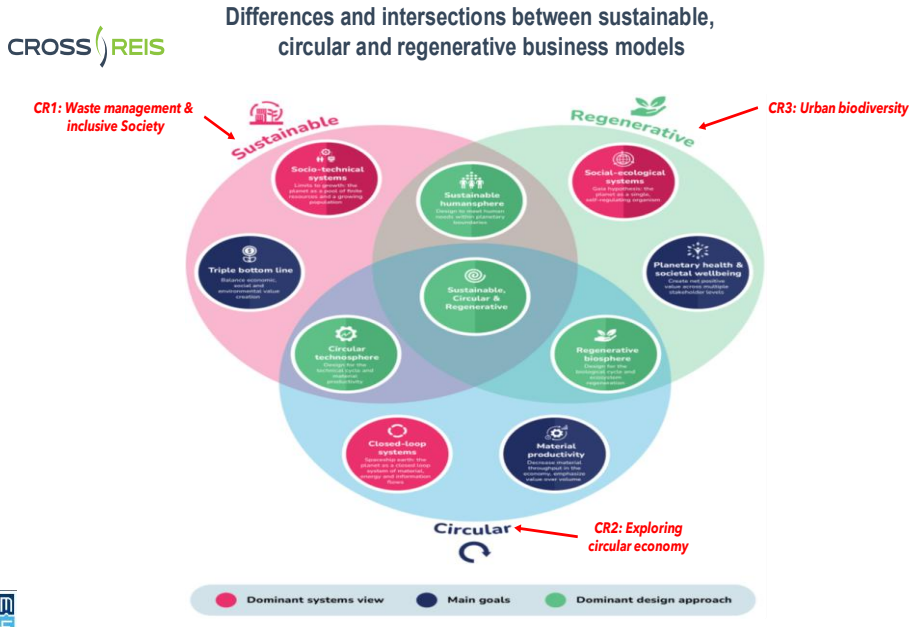
They all share a key vision: the world is finite, with biophysical limits that we can't exceed without threatening our survival, and we have human and moral minimum standards that we don't want to live below – that is, providing a level of sufficiency for everyone to live enough to thrive. In between those minimum and maximum limits is what Raworth calls the "safe and socially just space in which humanity can thrive". A net positive company "operates in that space and helps other get there as well" (Polman, P., Winston A., 2022, p.21).

2.2. How does regenerative differ from sustainable or circular economic paradigms?

To better understand what regenerative economy is, it is useful to highlight the differences from two other neighbouring concepts: sustainable and circular economy.

Differences and overlaps among the three concepts of sustainable, circular and regenerative economy are presented in figure 2 below.

Figure 2 – Differences and intersections between sustainable, circular and regenerative business models



Source: Konietzko et al., 2023, p. 377

Quoting the Konietzko et al. explanation of this figure "we frame these differences and overlaps in terms of their dominant systems views, main goals, as well as the design foci. In their dominant systems view, we find that sustainable business models focus primarily on socio-technical systems, circular business models on closed-loop economic systems, and regenerative business models on social-ecological systems. In terms of their main goals, sustainable business models focus on the triple bottom line (i.e. achieving a balance between economic, social and environmental value creation), circular business models on material productivity, and regenerative business models on planetary health and societal wellbeing." (Konietzko et al., 2023, p. 377).

Looking at the intersections, sustainable and circular business models share a design focus on the technical cycle and material productivity, sustainable and regenerative business models on designing solutions to meet human needs within planetary boundaries, and finally circular and regenerative business models focus on biological cycles and ecosystems regeneration.

The elements which help to distinguish sustainable, circular and regenerative business models – their main target, strategy and design approach - are summarized in table 1 below.

Table 1 – Overview of sustainable, circular and regenerative business features

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Differences and intersections between sustainable, circular and regenerative business model: Matrix view

BUSINESS			
Model	**Target** (making profit by)	**Strategy**	**Design approach**
Sustainable	Balancing economic, social and environmental value creation (triple bottom line)	Mitigate negative impact on nature and communities	Sustainable design for meeting human needs within planetary boundaries
Circular	Increasing material productivity	Organize closed-loop economic systems to minimize material and energy throughput, while maximizing value creation	Circular design for recycling manmade materials and durable products
Regenerative	Enhancing health and well-being in socio-ecological systems	Focus on integrated and interdependent systems and human society, ecological health and human well being	Regenerative design of nature based solutions contributing to ecosystems restoration and human well being

2.3. Regenerative practices

An empirical way to define regeneration is to describe concrete examples of regenerative practices. These can be clearly found in fields such diverse as agriculture, design, conservation, tourism and built environment.[3]

The most dominant industry in the regeneration literature is food and agriculture, which occupies large areas of land and has more than 50 % of the estimated overall pressure on nature and biodiversity (Kurth et al., 2021). The literature contains extensive reference to regenerative agriculture and its potential to improve species abundance, soil health and fertility, or store carbon through agroforestry. Another important legacy industry for regenerative thinking in business is the built environment (including infrastructure), because it is material intensive and co-occupies vast areas of land with nature (Robinson and Cole, 2015; Mang and Reed, 2020). There is a direct opportunity for organizations in this industry to source materials from regenerative sources, create more biodiverse habitats for other living species in cities and surrounding areas, and align buildings and infrastructure more closely with water, air, soil, carbon, and nutrient cycles.

A comprehensive **collection of regeneration practices** can be accessed on the www.regeneration.org website. This is based on the recent Paul Hawken book "Regeneration. Ending the Climate Crisis in one generation", and it is an organized cornucopia of information, ideas, groups, videos, books' references, and people who are implementing regeneration worldwide and who welcome support and involvement. The information is organized using the concept of "nexus" to identify regeneration practice challenges and/or solutions. Nexus are large, complex issues that intersect multiple institutions, geographies, cultures, and people, but which do not fall under a single category of action or impact. For each nexus category, the website includes:

1. Clear descriptions of the issues, history, players, and impacts.
2. The specific parties actively causing degradation and damage.
3. The NGOs, activists, affected populations, and other institutions that are addressing the issue.
4. Addresses and emails of CEOs, politicians, or other people who are key decision-makers.
5. Products and companies to lobby, avoid, or support.
6. Links to videos, conferences, documentaries, articles and papers,

The website is open source, and participation is welcomed to help improve, add and update the information on regeneration practices. The following checklist of questions is suggested for detecting to what extent an action is regenerative:

1. Does the action create more life or reduce it?

[3] One recent and complete **collection of regeneration practices** in several sectors can be accessed on the www.regeneration.org website. This is based on the recent Paul Hawken book "Regeneration. Ending the Climate Crisis in one generation" (Hawken P., 2023).

2. Does it heal the future or steal the future?
3. Does it enhance human well-being or diminish it?
4. Does it prevent disease or profit from it?
5. Does it create livelihoods or eliminate them?
6. Does it restore land or degrade it?
7. Does it increase global warming or decrease it?
8. Does it serve human needs or manufacture human wants?
9. Does it reduce poverty or expand it?
10. Does it promote fundamental human rights or deny them?
11. Does it provide workers with dignity or demean them?
12. In short, is the activity extractive or regenerative?

2.4. Regenerative value creation

Conventionally, creating *shareholder value* – potentially at the expense of other stakeholders, including the environment – was considered the sole purpose of business. The more a company was able to privatize gains and socialize losses, the more successful it would become. But since the 1970s, evidence has started to mount that such behavior is not sustainable on a finite planet with a rapidly growing population.[4]

A few years ago, the term *creating shared value* was coined, to describe how companies can continue to focus primarily on financial performance, by identifying ways to make money wherever their core business and societal problems overlap (…). But this approach is still insufficient to cope with the increasing complexity of the global economy. Today's companies operate in a world of complex, interlinked systems – markets, communities, ecosystems, etc. – in which linear notions of cause and effect evaporate. Any action in one area can lead to undesirable consequences elsewhere. A company embracing a shared value approach might – in all good conscience – seek to solve one problem, only to create another.

We can avoid these disconnects if we embrace systems thinking. The international sustainable development nonprofit Forum for the Future describes systems as "parts connected by a web of relationships toward a purpose," and offers examples from natural ecosystems like the marine environment and our food systems, and socially created systems, such as education. A human body, a home, a neighborhood, an organization, a city, a planet – all are systems.

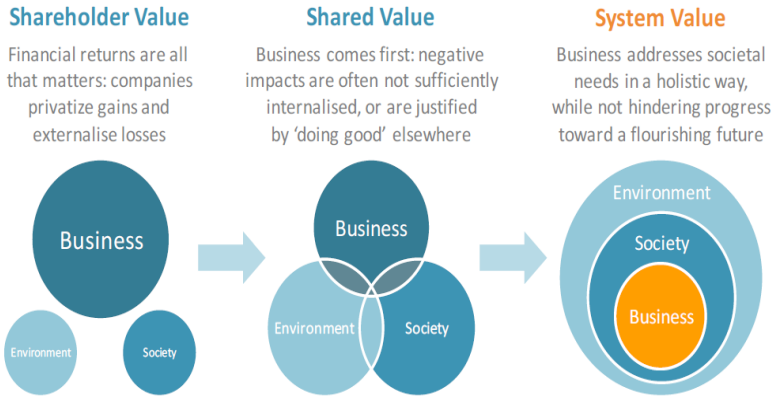
Changing a system means changing its purpose as well. For instance, consider our food system and its web of machinery manufactures, natural capital like soil health, farmers, workers, wholesalers, food companies, retailers and the eaters. Short-term, narrowly focused financial incentives drive the system to pay farmers very little, reduce the richness of soil, lower the health and nutritional quality of our

[4] A ground-breaking study in this respect was the 'Limits to Growth" report from Donella Meadows and others.

crops, weaken labor rights, and much more. Long-term, future fit regenerative farming financing schemes will encourage capital flowing to projects that seek environmental and/or nature restoration, together with social and community benefits.

Business can only thrive in a strong society. Society, in turn, can only prosper if its needs are being met by a healthy natural environment. These relationships are best described with a systems analysis approach, as nested dependencies of the economy on the society and environmental conditions, as shown in figure 3 below:

Figure 3 – Rethinking value creation through a systems lens



Source: Future Fit Business Benchmark, 2019

To understand the full extent of a company's impacts – good and bad – we must think in terms of *creating system value*. No business decision is ever free of potential trade-offs. But a system-based approach makes it possible to identify otherwise unforeseen issues. This allows negative trade-offs to be anticipated, avoided or, at the very least, addressed. This kind of holistic decision-making must become the norm if we are to avoid – and eventually reverse – damage to our natural systems and social fabric.

Creating system value and achieving a greater future-fit is possible only if economic agents – business, governments, civil society organizations – work together in pursuit of a collective progress towards which they all aim. But how can any specific social system (company, business ecosystem, territorial community – neighborhood, city, region, nation) that is taking its own purposeful actions be sure it is helping, rather than hindering, the collective progress?

To answer this question, we can classify the full range of impacts any social system may have across two independent dimensions – positive versus negative, and direct versus indirect:

- The social system's impact may be either positive or negative. Positive impacts are those which help to bring society into closer alignment with the desired regenerative outcomes. Negative impacts are those which hold us back.

- The social system's impact may be either direct or indirect. All social systems rely on the activities of others – for example, to provide them with essential goods and services – and those activities might lead to a wide range of impacts, both good and bad. We can classify such impacts as indirect, in contrast to the direct impacts which one's own activities cause.

Based on these criteria, any social system impacts are classified in four categories, as shown in figure 4 below:

Figure 4 – Matrix of footprint and handprint impacts

Source: Future Fit Business Benchmark 2019

This matrix of footprint (own negative impacts colored in blue) and handprint (own direct positive and indirect impacts colored in orange) helps us to define operationally a *regenerative economy break-even rule*, which can be used to guide regenerative business strategies.

So far, the conventional economic system has evolved to treat financial returns and value creation as one and the same thing. The financial break-even is achieved by any social system – a company, investor or other economic actor – when financial returns are at least able to cover the ongoing costs. Any profit is welcomed, but the minimum requirement is to break even.

The shift to a regenerative value-driven business requires a more holistic value creation approach: one in which all business and other social systems (e.g., government) strive to create system value by positively impacting all three dimensions - environmental, social and economic - simultaneously. To guide the creation of system value effectively, we must clearly identify what it means to break even for the social and environmental dimensions, extending the break-even rule to cover extra-financial performance. In a nutshell:

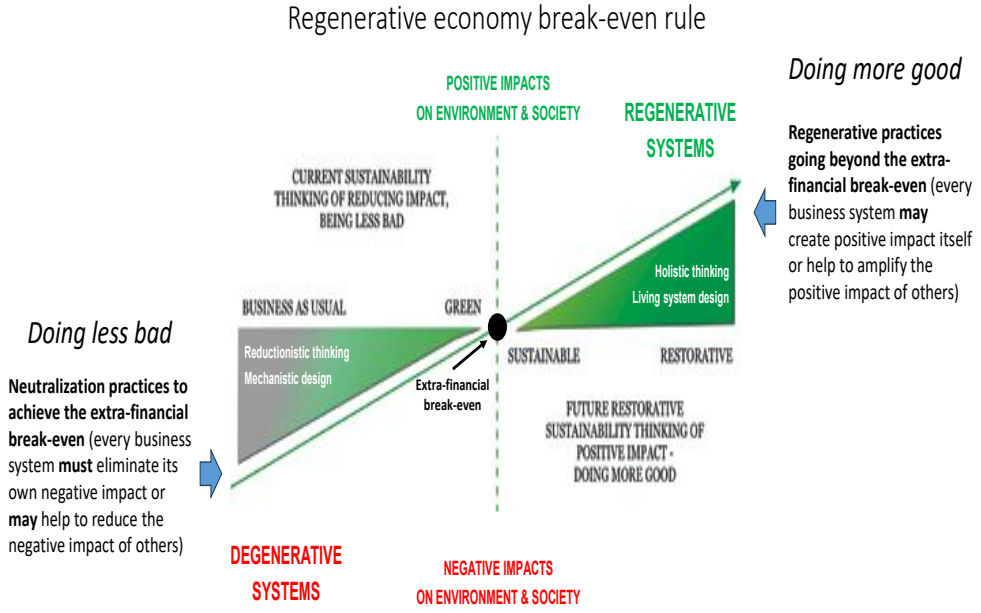
- Any business system *must* do everything in its power to reduce and eventually eliminate its own direct negative impacts, as well as indirectly reduce and

eventually eliminate any dependence on others who deliver negative impacts. Following this rule, the company goal is to achieve an *extra-financial break-even point.*

- In addition to achieving the break-even point, aiming to neutralize its own (direct) and other (indirect) negative impacts, a regenerative business *may* actively seek to speed up society's progress, by directly creating a positive impact itself, or indirectly by amplifying a positive impact created by others. In this way, the company goal goes beyond *the extra-financial break-even point.*

Based on this approach, the first commitment of a net positive business is responsibility for the impact it has across its value chain. This commitment is evident in companies adopting the Greenhouse Gas Protocol, which provides standards for how companies should measure carbon emissions, to take over a broader responsibility. The protocol puts corporate emissions in three categories, called "scopes": direct burning of fossil fuels in own facilities and vehicles (Scope 1), emissions from purchased energy that you bought from the grid (Scope 2), and emissions from own suppliers and from own customers when they use the company products (Scope 3). For most companies outside the heavy industries, transportation, and utilities, Scope 3 is the largest slice of the life cycle emissions pie. Companies can influence value chain emissions by working with suppliers on systemic change or by designing products that help customers to reduce their impact. Tech companies, for instance, by enabling virtual meetings, help companies cut emission from travel. And Artificial Intelligence (AI) tools for precision agriculture reduce energy use on farms.

Figure 5 – Visualization of the regenerative economy break-even rule



This scheme of scopes is powerful. Since that terminology is used mainly for carbon emissions, Polman & Winston suggest broadening the concept by calling them "Impact Levels" (L) and adding other three broader spheres of influence of a regenerative net-positive business. They suggest therefore six spheres of influence (impact levels) with a core of direct operations (L1) and moving out to indirect operations (L2), value chain (L3), sector and community (L4), systems and policy (L5) and the world and society (L6). As you move outward, "the company control greatly diminishes, and the focus turns to influence, advocacy, and partnership" (Polman, P., Winston A., 2022, p.251). The six impact levels framework is applied to show the greenhouse emissions in line with the scopes framework, but also simultaneously to give an example along the dimension of well-being, starting with employee safety at the core (L1) and extending out to employee well-being (L2), supplier and customer well-being (L3), community well-being (L4), influence on systems of well-being as healthcare, food, etc. (L5) and human and natural world thriving at the largest level (L6).

Summing up, a net-positive company considering all the six spheres of influence will aim to pursue regenerative impacts at all levels, beyond the extra-financial break-even, creating system value with a better future-fit alignment. The concept is summarized in figure 5 below:

In practice, regenerative business leaders should formulate specific break-even goals, which can be grasped by key stakeholders without lengthy explanation and represent the minimum level of performance to aim for, related to one issue (e.g., income inequality, waste). All specific goals together will then identify the social and environmental break-even point that every company/social system must reach.

2.5. Regenerative finance

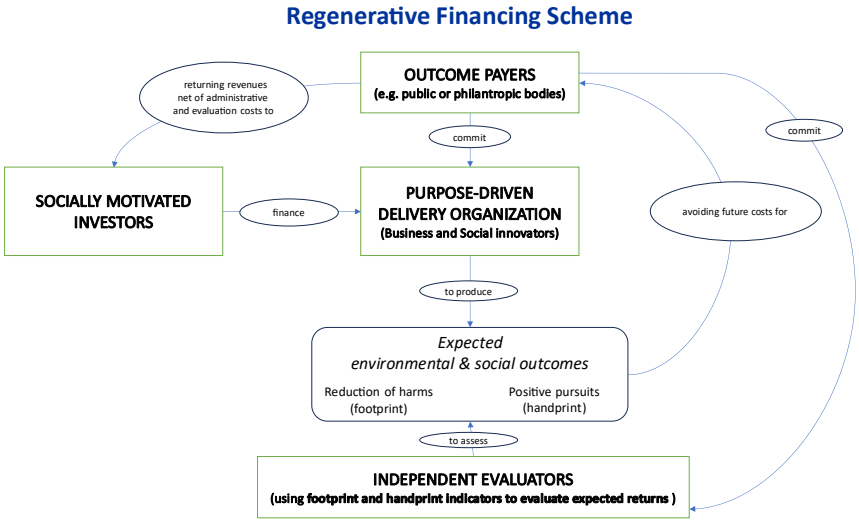
The term "regenerative finance" describes finance for projects that are designed to increase prosperity in terms of regenerating environment, nature and that also have community aspects, aiming to provide a more sustainable future for all. Underlying the conjunction of "regeneration" and "finance" is the idea that the extractive or consumptive nature of traditional financial instruments, systems and services is stripped away and rebuilt so they regenerate rather than exploit.

Our current financial system encourages decisions that are based on how to make as much money as possible with the lowest level of risk. To foster regenerative economy growth, we need to shift to a regenerative finance system that encourages making as much money as possible but in a way that is consistent with achieving positive environmental and social impacts and with the lowest level of economic risk. A novel concrete way to make finance "regenerative" – i.e. supporting regenerative value-driven businesses – is *impact investment*. This approach to investment marries social and environmental impact ("doing good") with economic profit ("doing well"). Social Impact Bonds (SIBs) - the most used form of impact investment - are outcome-based contracts for services between an outcome payer (usually a government or philanthropic foundation) and a delivery organization (a social enterprise or purpose-driven business) to achieve social or environmental

outcomes. Achieving social and environmental outcomes is expected to produce future savings for the outcome payer budget, avoiding costs that this will have to cover if those outcomes are not achieved. An investor then provides the funding to deliver the services. If results do not meet the targets set in the contract, the investor loses their money, having effectively made, at worst, a philanthropic donation. If, on the other hand, the targets are met, the investor receives the investment back, with a return that rises with the extent of the outcome achieved. Independent evaluators are needed to verify the outcomes achieved, in terms of targets to which impact returns are linked.

This impact investing scheme is illustrated in figure 6 below:

Figure 6 – Regenerative financing scheme



To make this regenerative finance scheme work on a large scale, it is necessary to measure impact dependably. To change the behavior of investors and companies, it is essential that we measure companies' extra-financial results (both footprints and handprints) in a way that is easily understood by everyone. One priority therefore is to work towards standardized metrics for different environmental and social impacts, aiming to go beyond measuring a single impact to measuring all significant impacts created by organizations or initiatives.

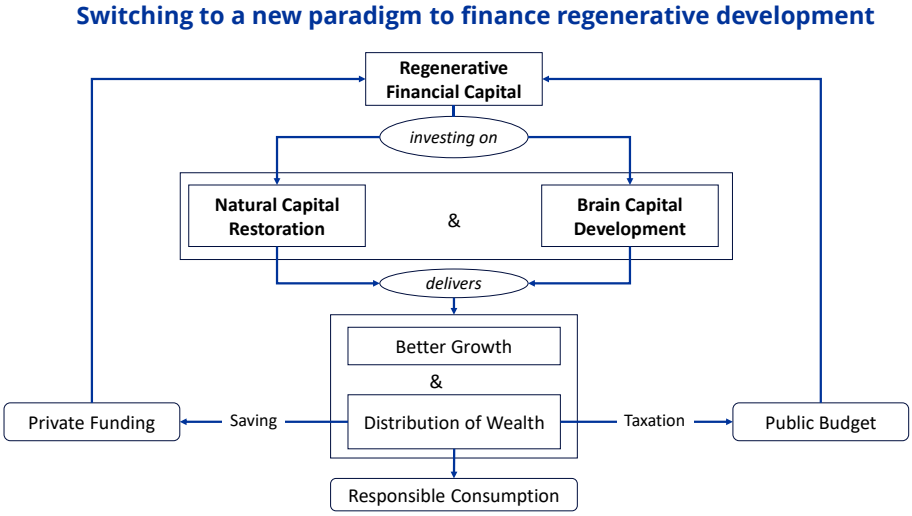
The development and diffusion of extended financial accounts - that reflect both the financial performance of a company (profit and loss statement and balance sheet), and the impact it creates on people and the planet through its products, employment and operations – will be the watershed between the traditional risk-return and the new risk-return-impact paradigm driving regenerative financial capital.

Eventually, we may assist to a paradigm shift in global finance towards a prevalent pattern of regenerative finance, whereby the impact investment approach is spread worldwide to fund nature capital restoration and brain capital development projects that ultimately should contribute to deliver better growth and more

distributed wealth - enabling a virtuous economic cycle of regenerative development as sketched in figure 7 below.

Clearly this all sounds like great progress for nature and society – and it is - but there are challenges and drawbacks both in the technological aspects of regenerative finance and in the biodiversity and nature methodologies underpinning these projects, which tend to be complex and also highly specific to the relevant ecosystem. Regenerative finance is like impact investment, but there is commonly a fundamental digital element, typically employing blockchain, which may be used to simplify tracking of payments, to embed automated smart contract functionality or to make monitoring, reporting and verification (MRV) of real-world results both transparent and credible.

Figure 7 – A new paradigm to finance regenerative development



There is however a risk that the use of tokenization and blockchain can make investments and credits more complex than they need to be, rather than simplifying and increasing the credibility of processes. Conversely, even if the use of blockchain and tokenization is entirely appropriate for a particular project or a specific benefit, it is not a "fix-for-all" solution. If the methodology underpinning the project is flawed and does not achieve the applicable carbon ultimately, as well as nature and/or biodiversity aims, then the planet will not see the impact it needs, no matter how safe and transparent the relevant technology is.

2.6. The regenerative economy delivers more, less or better growth?

Regenerative practices may do more than anything in the next generation to reverse the deteriorating human and environmental conditions that accompany unchecked human expansion. Limiting and reducing that damage, whilst working relentlessly to raise the living standards of the poorest third of humanity, is arguably the most pressing problem of our time. The hub of the problem now is how to flip over the

magnificent growth energy of modern civilization into a non-acquisitive search for deeper knowledge of self and nature. If people come to realize that there are many non-material, non-destructive paths of growth, it would help dampen the common fear that a steady state economy would mean deadly stagnation.

Clearly, we must look at growth differently. Some measures of company success should grow almost without limit – engagement and purpose of employees, customer satisfaction and wellness, and community well-being. This is "net positive" growth. However, in terms of physical material, the world is not regenerative, circular or decoupled from today's growth. The harder question on consumption is how much stuff we need. A thriving world is one where every person has their basic needs met. Even that low bar would vastly increase material demand, as billions rise out of poverty. Since sincere climate action has started too late, we cannot hit the targets we need and reduce inequality to increase the quality of life for billions without something to give. That something may need to be the consumption of the richest billion among us: as Mahatma Gandhi said, "the rich must live simply so that the poor can simply live".

At the core, shifting toward a regenerative economy will need to restate that economic growth is to find the way for societies to provide people with the opportunities, goods and services they need for a dignified 'good' life. GDP per capita is a broad measure that's useful for comparing countries with each other and over time. However, natural capital (the services and goods provided by nature) is not measured when calculating GDP, and environmental destruction often scores as a positive – a forest generates GDP when it is chopped down, for example. This is clearly unsustainable, and economists including Kate Raworth, author of Doughnut Economics, have proposed more appropriate metrics to measure economic growth in the twenty-first century. We value what we measure, and we need to find better ways of measuring the things that contribute to a nation's wealth, such as clean air, healthy soils, and dignified elderly care, which don't obviously contribute to GDP or incomes.

Recall, also, that economic growth is the increase in the amount and quality of products and services over time. Moving from coal power to wind power, even if the same amount of power is produced, is an increase in quality of power – air pollution is slashed, greenhouse gas emissions are avoided, and wind turbines are safer and require less maintenance. This, then, is "qualitative" economic growth. If scientists find a way to cure cancer or eliminate malaria, that is qualitative growth. In other words, economic growth is not intrinsically predicated on an increase in unnecessary consumption or of pollution; we do not need to replicate all the growth patterns of the last couple of centuries, we can grow better with better policies. "Better no Bigger" could become the best motto for a regenerative economy.

The currently relentless economic growth assumes instead that the human species can with articulate with impunity its own purposes unchecked by imperatives to relate to, or to honour, the diverse purposes of other species. Today's global economic activity, because it overly equates fulfilment too much with quantitative growth rather than qualitative enrichment, prompts humans to encroach too far, too fast on the habitats of other species. This extreme emphasis on unlimited quantitative

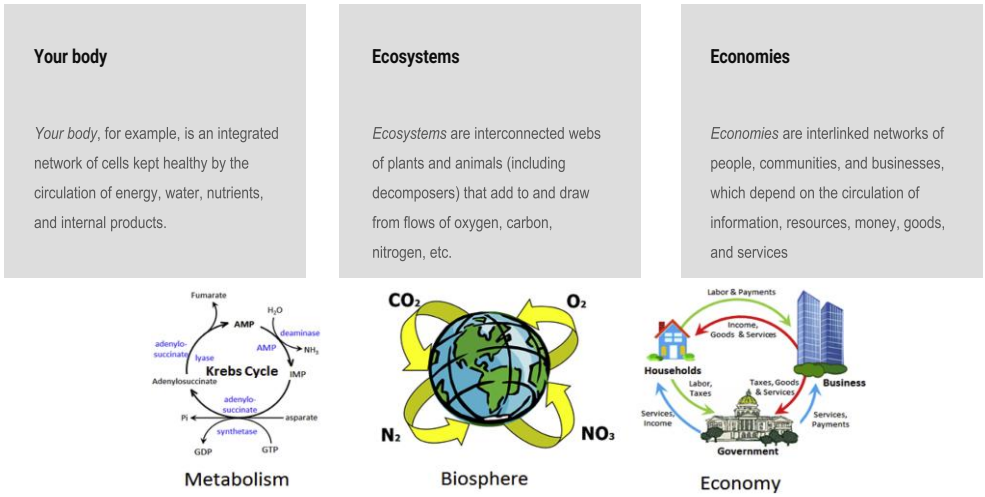
growth has increasingly divorced humankind from the natural ecosystem that does sustain all life on Earth. By switching to a regenerative economy paradigm, humankind will have the opportunity to end the tendency to use its unique creative power to extend its own domain without regard to the welfare of other species or the total life-support system itself. While humans have exercised this power for eons, the effect today is particularly devastating because of the unusually potential of modern high technology. To escape from this condition, the key message of regenerative economy is that there is hope if we become more attentive to ecosystems wisdom – "the way nature works" – and less intent on using technological knowledge to evade ecological constraints.

2.7. Regenerative Innovation eco-Systems (REIS)

Regenerative companies do not play alone, they contribute with their activities to a whole *regenerative innovation eco-system*, encompassing several complementary firms and other government, education and civil society institutions working for a regeneration purpose.

Borrowed from biology, the term "ecosystem" generally refers to a group of interacting entities that depend on each other's activities. Business ecosystems require providers of complementary innovations, products, or services, that might belong to different industries and need not be bound by contractual arrangements—but have significant interdependence, nonetheless. Especially "innovation ecosystems" are focused on a particular innovation or a new value proposition and the constellation of actors that support it – and when the innovation creates regenerative value we speak of "regenerative innovation ecosystems".

Figure 8 – Examples of flow networks



Looking at innovation ecosystems through the lens of science complexity (Russel M.G., Smorodinskaya N.V., 2018), we can consider them as *open non-linear systems* that are characterized by changing multi-faceted motivations of networked actors, high receptivity to feedback, and persistent structural transformations,

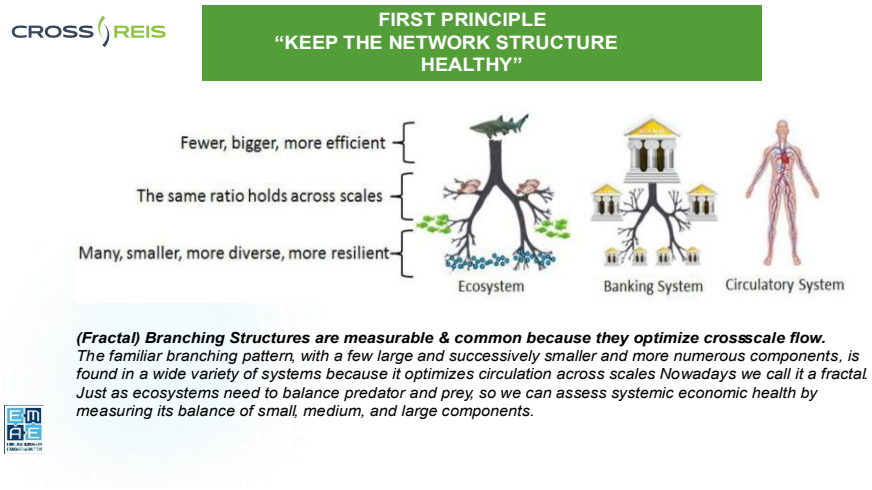
induced both endogenously and exogenously. Such ecosystems rely on the agility of network relationships (Adner, 2017) and collaborative, non-hierarchic models of governance, which enables their self-adaptability to rapid change. Their further proliferation demands decision-makers of all levels to provide and support a favorable context (social, economic, institutional) for continual networking, more horizontal linkages, and the enhancement of collaborative cohesive milieu within and among entities and economies.

Taking a holistic perspective, a whole regenerative innovation eco-system can be schematized as a *flow network*. This concept is initially developed in the context of Energy Network Science (ENS) to represent not only energy flows (e.g. various forms of fuels, oil, gas, solar, etc.) but also any kind of flows that are critical to drive the system. In a nutshell, according to this perspective a *regenerative system is a flow network whose existence arises from and depends on circulating energy, resources, or information throughout the entirety of its being.*

As shown in figure 8 below, examples of flow networks surround us in nature and society, and our own body is a flow network itself. All flow networks follow some universal principles to stay healthy and vital:

1. **Fractal structure**: A wide variety of systems - from leaves and river deltas to circulatory systems and ecosystems - exhibit a hierarchical branching pattern connecting a power-law ratio of small, medium, and large elements across scales. Big, efficient elements (arteries or multinationals) provide the speed and volume needed for rapid cross-level circulation, while the many small elements (capillaries or local contractors) reach every nook and cranny. This first principle is visualized in figure 9 below.

Figure 9 – Healthy flow network structure

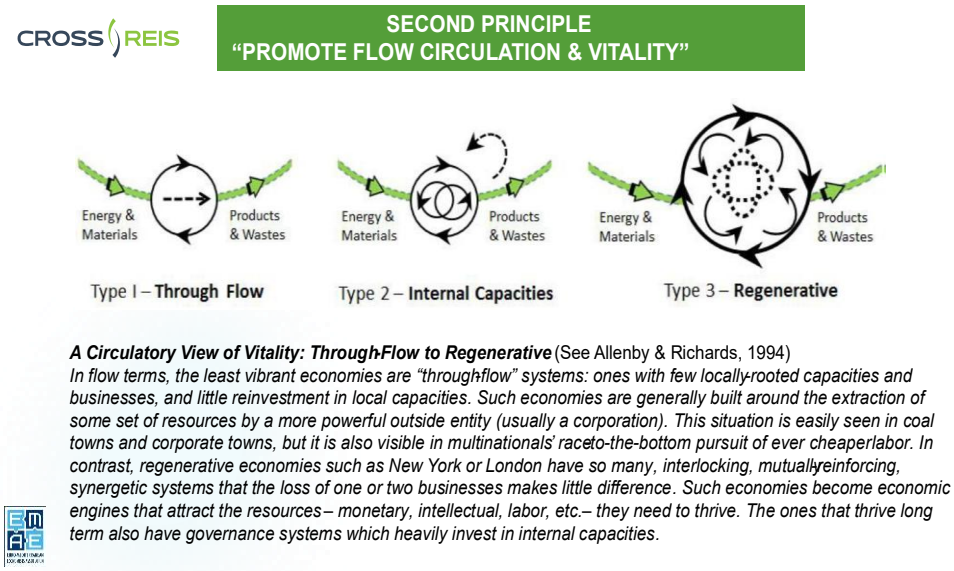


Source: Goerner S., 2015

2. **Robust circulation**: Robust, timely circulation of critical resources is essential to support a system's internal organization and processes - and the more organization there is to support, the more nourishing circulation is needed to

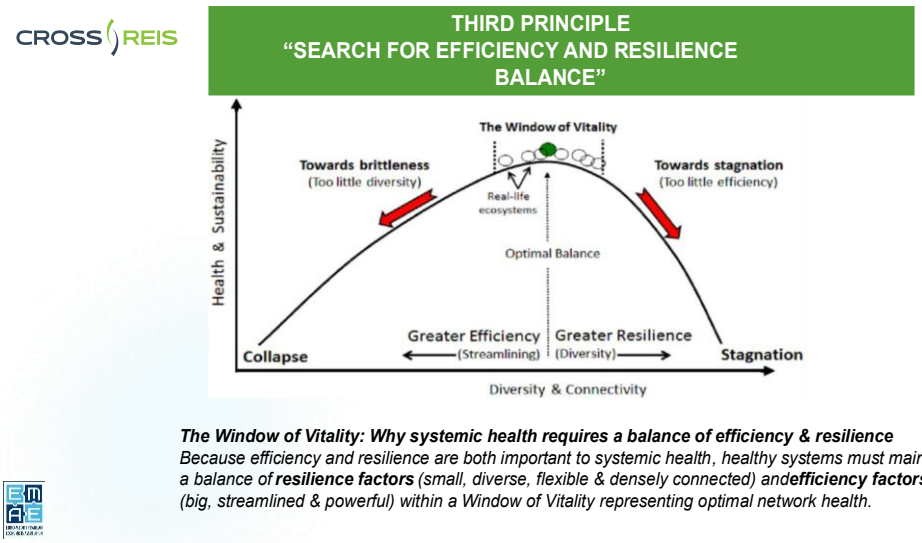
support it. If critical resources do not adequately nourish all sectors or levels, then we can expect the undernourished segments of the economy to suffer and eventually become necrotic. This thought applies as much to human organizations as to natural ecosystems. This second principle is visualized in figure 10 below.

Figure 10 – Robust flow network circulation



Source: Goerner S., 2015

Figure 11 – Healthy balance of efficiency and resilience



Source: Goerner S., 2015

3. **Balance of efficiency and resilience factors**: Healthy systems maintain a balance of resilience factors – with the presence of small, diverse, flexible, and densely connected agents - and efficiency factors - big, streamlined, and powerful activities - within a window of vitality representing optimal network health. This third principle is visualized in Figure 11 below.

These principles make economic flow vibrant over the long-term period. Since the circulation must reach all parts of the system, systemic health is more a function of where money goes than of how much money is exchanged (i.e., GDP). The two key questions for regenerative health are therefore: 1) how much energy (i.e., money, resources, and information) is directed towards constructive activities like building a road, vs destructive ones like polluting the environment; and 2) how much is directed toward building and maintaining capacities. The latter is particularly critical. So, just as your body turns the food you eat into the energy and nutrients you need to feed your brain and muscles, so any society that wants to stay vibrant over the long-term period should better pour money and resources back into developing and endlessly renewing the human capital and material infrastructure that allows it to function well.

By the same token, systemic health is also a function of optimal network structure. For instance, just as an ecosystem must maintain a particular balance of predators and prey, so healthy economies must also maintain a proper balance of small, medium, and large organizations. One reason a proper balance of small, medium, and large organizations is critical is that this arrangement supports sufficient actors at each scale to perform that scale's functions.

Maintaining proper balance of power also helps keep actors at any scale from doing excessive harm to other parts of the system. This concept of scale-appropriate entities actually has wide application. It explains, for example, why maintaining sufficient diversity of perspectives and/or talents is critical to healthy functioning, and why hiring local workers, who are well-connected and know the local community, has benefits for businesses that want to serve local needs effectively.

Finally, the need to maintain a balance of small, medium, and large elements also explains why vitality also requires a balance of efficiency & resilience. *Resilience*, the ability to spring back from crises, generally increases with diversity and the flexibility that goes along with small size. Efficiency, meaning ability to focus efforts and move large amounts of materials, generally increases with the high capacity and streamlining uniformity that tends to go along with large size.

Systemic health requires a balance of these two critical factors because both are important, but the characteristics that support them run in opposite directions. Too many small agents with too little efficiency or capacity leads to economic stagnation due to lack of efficiency. Too much monopolistic concentration with too few agents creates economic brittleness due to loss of resilience.

3. Conclusion

Regenerative business models offer a path towards a more responsible future by incorporating strategies that go beyond net zero and focus on actively restoring the natural and social systems they operate in, creating a more holistic net positive impact. In the previous sections of the paper we have given an overview of regenerative economy definitions and principles, with an excursus through the concepts of net-positive business, how regeneration differs from sustainability and circularity paradigms, system value creation, regenerative finance, the delivery of better growth, and the application of flow network theory principles to characterize Regenerative Innovation eco-Systems (REIS).

The key finding is that we live in times of deep and accelerated transformation of our economy, and we have the opportunity to steer this as a transition to the new regenerative economy paradigm described in the paper, beyond the sustainability drive. Everything in our world is interconnected. Taking a narrow view of complex systems is no longer an option. Today's linear economy is failing. We need to transition to a regenerative economy and see the bigger picture. 'Doing less bad' is no longer enough. Regeneration goes beyond sustainability and seeks to 'do more good'. By creating conditions that support life in all its forms, regeneration has a positive impact on nature, society and the economy.

We are in a period of regenerative economy transition that will see the restoration, renewal and regrowth of environmental, social, and economic systems. Taking such a holistic perspective creates a thriving balance between the different systems and allows them to flourish together, rather than one being traded off against the other. The transition phase in which we now find ourselves may well be shorter than many expect, if the adoption of new methods progresses quickly, as has been the case in the past with former industrial revolutions.

In this context, we recommend to pursue two main directions of future research and responsible innovation.

First, we should all become aware that *doing less bad is not enough*. To enact this motto, pursuing "net-zero" transformation scenarios is no more enough, we need to move foresight and scenario building studies towards more radical exploration of possible regenerative futures. The core issue is how to foster future oriented policy making, i.e. a process of designing and implementing policies that anticipate and address long-term challenges, opportunities, and trends, to eventually take decisions that generate effective action for highly complex problems as the regeneration challenges usually entail. Extremely complex issues can tend to make us believe only experts can find solutions. We – the "citizens" – unintentionally give our power over to technocrats, international leaders, or scientists, and hope they do something to get it right. But a direct way to create a more effective system is pushing the power of decision-making out of the periphery and away from the center, giving people the room to adapt, based on their experience and expertise. All that should be supported by investing in participation processes – is that people talk to each other and take responsibility. This is what well organized *regenerative innovation living labs* can do, and it works to empower citizens and stakeholders giving them the room for

working together with experts and policy makers on future oriented policy issues, and search solutions to wicked problems.

Second, we should all ask ourselves: *Is our life good enough?* A way for answering this question has been recently proposed in the context of the ESPON programme, with a chain of applied research projects aiming to define and experiment a methodology to measure present and future quality of life in European cities and regions, with the ultimate purpose of improving the coordination and effectiveness of territorial quality of life policies across the continent. A major step forward in assessing the territorial quality of life was achieved, indeed, with the ESPON QoL–Quality of Life Measurements and Methodology project, which defines territorial quality of life as "the capability of living beings to survive and flourish in a territorial context." (Sessa et al., 2020, p. 4). The project developed a *conceptual model to measure territorial quality of life in all its facets*, encompassing three spheres – personal, socio-economic and ecological - and three territorial quality of life dimensions: good life enablers, life survival or "maintenance," and life flourishing. This Territorial Quality of Life (TQoL) dashboard of indicators has been used so far to map quality of life conditions across all NUTS3 regions in Europe (ESPON 2020), across all municipatilies of Slovenia (ESPON 2022), and in several local pilot cases scattered in Europe. The use of different indicators makes possible in-depth insight into the specific features of a particular region or municipality, defining its strengths and weaknesses and thus areas for policy intervention. The dashboard can serve as valuable tool for local decision-makers in directing the development of a particular municipality or region, and it can support as well spatial policies at national level aiming to ensure cohesion of regional territories. Besides the measurement outcomes, the aspect more interesting of the TQoL methodology is the living lab process tested in several pilot cases, engaging the citizens in a co-creation activity to select the quality of life priorities and related indicators. This approach can be adapted and replicated for building up regenerative innovation living labs aiming to steer the transition to a regenerative economy in the regions of Europe.

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IZA ODRŽIVOSTI: PRINCIPI REGENERATIVNE EKONOMIJE I PRIMENA U POSLOVNOJ PRAKSI

Apstrakt: *Na osnovu rezultata CROSS-REIS treninga na temu „Izgradnja kapaciteta i baze znanja za upravljanje regenerativnom ekonomijom", održanog u EMEA, u Barseloni, 30. oktobra 2024. godine, rad pruža pregled definicija i principa regenerativne ekonomije, uz ekskurz kroz koncepte neto-pozitivnog poslovanja, razlike između regeneracije i paradigmi održivosti i cirkularnosti, stvaranja sistemske vrednosti, regenerativnih finansija, ostvarivanja boljeg rasta, kao i primene principa teorije mreža protoka za karakterizaciju ekosistema regenerativnih inovacija (REIS). Predloženi su pravci budućih istraživanja u cilju uspostavljanja living labova za regenerativne inovacije, koji angažuju građane, stručnjake i donosioca odluka u različitim regionima Evrope, sa ciljem podizanja svesti o izazovima i prilikama koje pruža regenerativna ekonomija, kao i procene da li je sadašnji i budući kvalitet života dovoljan za sva živa bića – što predstavlja krajnji cilj tranzicije ka regenerativnoj ekonomiji.*

Ključne reči: *Regeneracija, Neto-pozitivno, Regenerativne finansije, Mreža protoka, Teritorijalni kvalitet života.*