



Applying Systems Thinking Yields Regenerative Urbanism *as a platform for inventing sustainability success*

Presentation No. 1 of 4
Applying Systems Thinking Panel
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Acknowledgements

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Introduction



- Sustainability Practice's **Predicament**
- Key Aspects of **Systems Thinking**
- **Why** use it?
- **How** to Use it: Begin Practicing
- **Three Cases**
- **Call to New Practice**

Sustainability Practice's Current Predicament?

Sustainability Practice faces a Predicament

Accelerating life support system *insecurity*

After 30 years of practice (Rio1992)
Limited progress, but not success

Many reports . . . Documenting a **closing window of opportunity**

- 1972 Club of Rome Report (50 yrs ago): had about 300 years to reverse course.
- 2018 IPCC: **only ten years** left to reverse course and avoid irreversible systems change.
- 2019 UN IPBES Global Assessment: unprecedented decline of nature
 - Sixth mass extinction
- 2021 KPMG Study: **societal collapse** by 2040 not 2060?

Earth Overshoot Day: July 28th 2022

Now consuming 1.75 earths per year by liquidating natural capital “savings” and consuming annual production

Cannot grow current economy **without crashing nature**

Our current approach **may not produce sustainability**, at least in time

WHY? We Treat Symptoms not the Source

- See problem as environmental instead of as economic, embedded in
 - economic processes, tools, and design
- Use a static not dynamic systems lens and approach
- Mis-specify sustainability.
 - Make sustainable parts (buildings, cars)
 - instead of making sustainable systems.

Visible Symptoms

- Air pollution
- Contaminated rivers
- Urbanization
- Car focused, large surface parking
- Not connected, not people-centric
- Etc.

WHAT to do?

Maybe we need a new approach?

Sustainability is a system “state,” a system condition, not a part.

Make sustainable systems, not sustainable parts alone.

"An endless number of green buildings do not make a sustainable city."

-- Jan Gehl, from "Taking it to the Streets," an interview in Greensource Magazine..

Key Aspects of Systems Thinking

What is systems thinking for you, in your practice?

A Different Lens for a Different Result

Systems thinking is a different

- Perspective
- point of departure
- method of inquiry
- approach to
 - Management
 - problem solving
 - and public policy.

Reality is a complex, non-linear, dynamic system.

Yet our traditional tools and lenses are static, linear, and presume independent parts.

With this static approach,

- today's "solutions" breed tomorrow's "problems"
- Because those solutions change the system in unforeseen ways.

Central Features of Systems – Our Reality?

Definition: “A system is an interconnected set of elements that is coherently organized to achieve something.”

Thinking in Systems, Donella Meadows, p 11

Reality is a dynamic nested system of systems.

Systems behavior arises from the relationship between parts.

Systems change is often not linear, smooth, or slow, but exponential, discontinuous, surprisingly fast, and potentially irreversible.

AND the “whole” system is greater than the sum of its “parts.”

System’s have “emergent” behavior that is unpredictable from parts. Such as,

- “life & consciousness” from the physical body.

Need a systems approach for a systems reality

In Planning & Design

Most simply,

- Recognition that **reality is complex**, many interacting causes and parts
- Interdisciplinary approaches, such as the **logic of our “Comp” Plans – citywide performance**

More formally

- **An “ecosystems” approach of “Ecological Design (Van de Ryn), Ecological Urbanism (late 20th century into the 2000s)”**
- Accelerating into **Regenerative Design 2005+**

Most formally

- **General Systems Theory** (Bertalanffy, 1968) – **a Systems Approach** (Churchman, 1972)
- **Systems Dynamic Modeling** (Donella Meadows, Club of Rome/Limits to Growth, Earth4All)
- **Systems Thinking – the fifth discipline of learning organizations** (Peter Senge)

Applied to Sustainability

- **Add strategic planning practices** (The Natural Step, International Living Future Institute)

Formally: A discipline for seeing wholes!

Peter Senge, *Fifth Discipline*, 2006, p 68.

- Basis for shifting the mind:
 - From seeing static parts *to dynamic wholes*
 - **Inter-relationships**, not things
 - underlying **systems structures** and **points of high-leverage change**
 - From being helpless reactors *to active shapers of reality*
 - From reacting to the present *to creating the future*
- Helps us **address the complexity of systems-breakdown** problems
 - such as climate change, that have no simple local cause

Yields Capacity to **Navigate**
Complex Systems Change Effectively

Informally: It is a Powerful Thinking Tool

Can generate routine and paradigm-shifting insights, such as . . .

What is the real value of **energy efficient buildings**?

- When scaled, they enable the necessary renewable energy economy.
- Yet our policies are based only on the limited value of fossil fuel savings.

What is the role of the **built environment** in the future distributed renewable energy economy?

- It could function as a massive, stationary solar energy plant,
 - if we used photovoltaic building materials.
- Yet, this potential is not even being considered when it would be the enabling anchor of that economy.

Why apply systems thinking to sustainability practice?

Is it the basis for the new approach we need?

What do you think?

I found that using systems thinking in my sustainability planning practice

Revealed the antidote for our predicament

Over time, I connected the dots

- From our current practice of **ad-hoc green planning and design**
 - to the **urban metabolism of city sustainability** when fully scaled
- From **regeneration** as the core concept
 - to the concepts of the **regenerative built environment** and **regenerative urbanism**
 - and the new **systems planning & designing practice** that will produce it
- From the **built environment** to the **economy**
 - revealing the **built environment-economy** connection
 - that links the **regenerative built environment** to the **regenerative built economy**
 - **which is the foundation** for and spur to the larger **ecological economy**
 - because it produces **the metabolism of city** and societal **sustainability**
 - instead of **unsustainability**

Connecting the built environment to the economy is transformational and key to sustainability success

When we realize that the **built environment is the built economy**, we see how our plan, design, and build professions' roles shift to being society's lead agents of sustainability success.

We are **either planning and designing unsustainable or sustainable built environments, economies, and communities.**

As such, our professions' value propositions increase exponentially

FROM creating nice-to-have aesthetic value, which is often value-engineered out
TO creating must-have economic value, **which we must now value-engineer IN for sustainability success** by planning & designing the regenerative built environment and associated sustainability economy

As a result, we can **now finally design a win/win future of jobs AND the environment & resolve the classic but false trade-off.**

How do we shift to regenerative systems sustainability practice?

From parts sustainability to systems sustainability

By redefining understanding and practice

of sustainability

around regeneration
as the core principle

and producing
regenerative built
environments &
urban metabolism

By shifting focus from silos to systems

- From content TO context
- From independent parts TO relationships
- From static parts TO dynamic systems
- From problem symptoms TO sources
- From the environment TO the economy
- From goals TO systems performance imperatives
- From non-renewable TO renewable energy
- From linear TO circular material flows
- From subsystem TO whole system optimization
- From impact reduction TO avoidance by design
- From net negative TO net positive impact
- From buildings TO city-region systems
- From problem solving TO future designing

This shift connects the human economy & society to the biosphere's living system

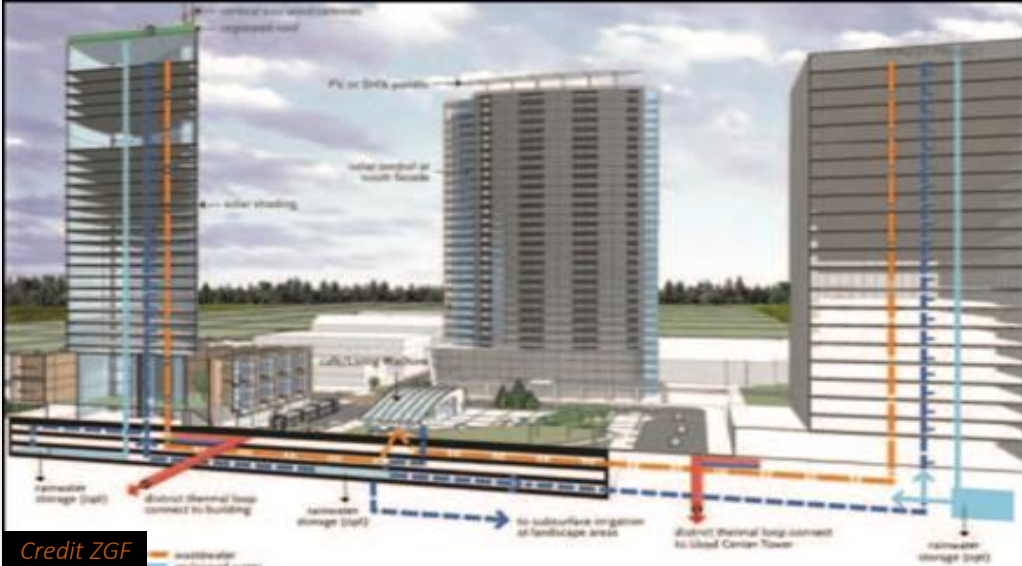
- *not* with *net-negative* impact mitigation, as we do now
- *but* at the foundational level of **operating principles & systems performance imperatives** that produce sustainability and success

By catching the wave of the emerging approach No need to invent it anew

It's already bubbling up in our practices' innovation.

- **Planning** | Formulate the policies & rules for producing regenerative settlements (Eco-Districts, -Cities, -Regions); **Biophilic Pl. & Design** to connect health & land use.
- **Urban Design** | Add water & habitat (biophilia) to the urban design palette to create high-performance living places as part of a living systems urban metabolism.
- **Architecture** | Prioritize energy efficiency to enable the renewable energy economy. The 2030 Challenge, NZE+T (buildings + transportation), Passive House building tech. etc.; and **biophilia** to create living Buildings/Walls/Roofs.
- **Landscape Architecture** | Shift from aesthetics to **habitat creation** for biodiversity & human health (Biophilic Pl. & Design) in living city-regions.
- **Utilities** | Shift from gray to green urban **infrastructure** with nature-based solutions and ecosystem-services to create living urban & regional metabolism.

Recognize it, learn it, grab it, and go.



Credit ZGF

Then we can make the key move:

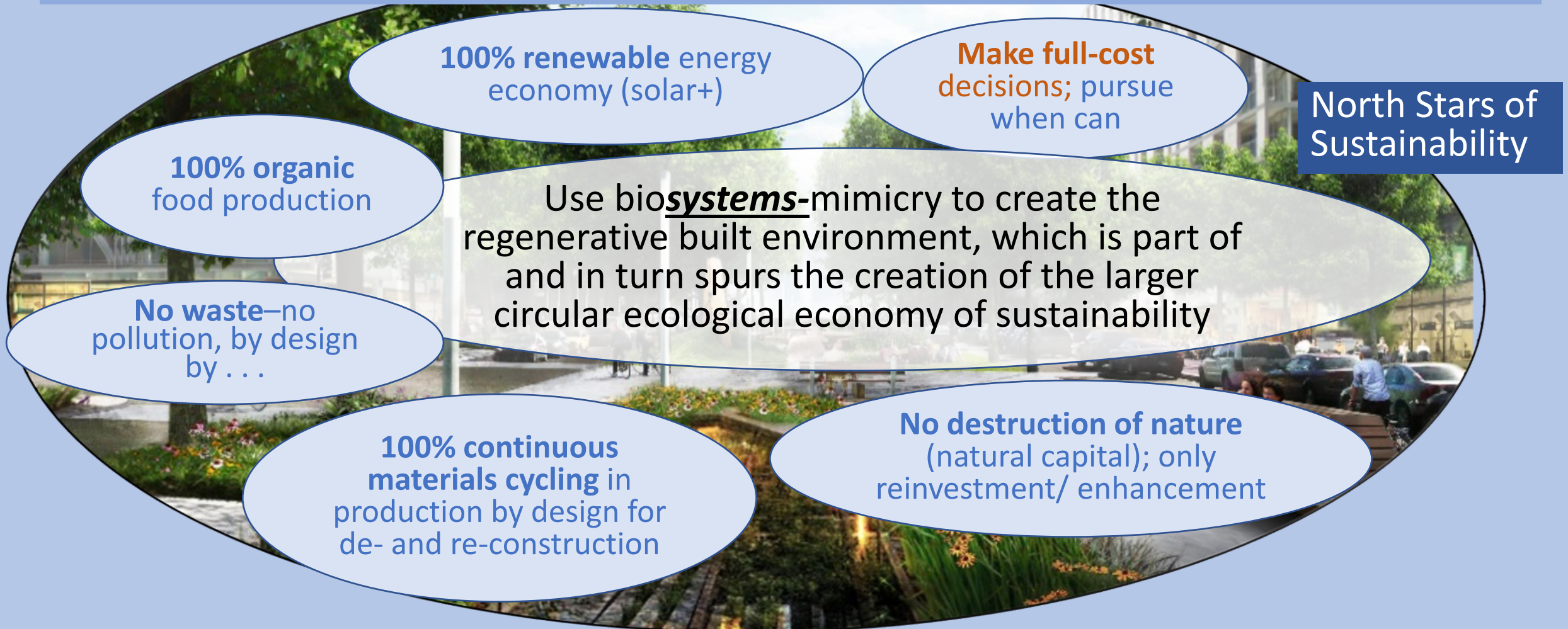
Connect our current sustainability *planning and designing practice* to *the regenerative living systems performance imperatives* of sustainability.

Doing so produces the **systems sustainability**,
not unsustainability, disequilibrium, and collapse.

But what are these imperatives?

The Regenerative Systems Performance Imperatives

Adopt them for our human systems **and innovate to** systems sustainability performance to reclaim and **produce life support system security** for human and ecological systems.

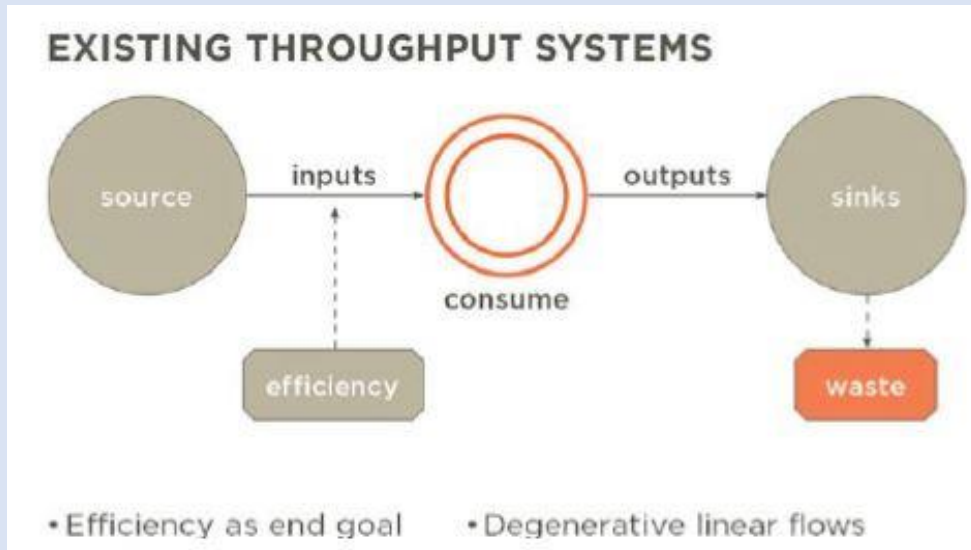


Connecting our work to achieving the regenerative systems sustainability imperatives

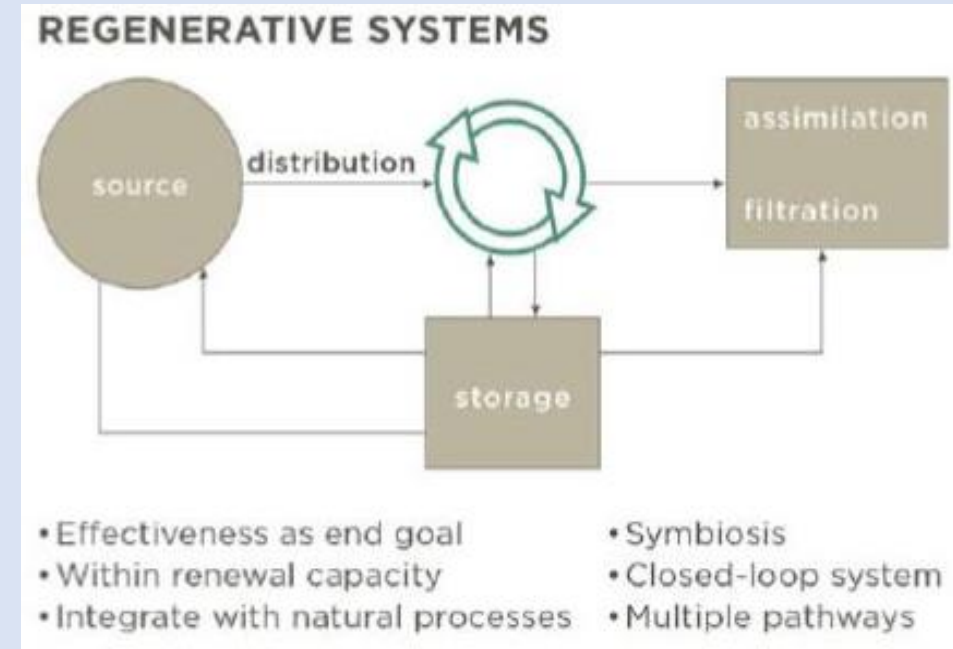
Illuminates the **real gap to sustainability success** to which we **need to innovate** with our planning, design, and other practices

It shows us **the right direction** and the **big moves** to sustainability success, **as follows:**

Enhancing **BOTH** ecological AND economic **carrying capacity** by design



By transforming **linear** flows in the current human system that produce waste & use up finite resources **by design**



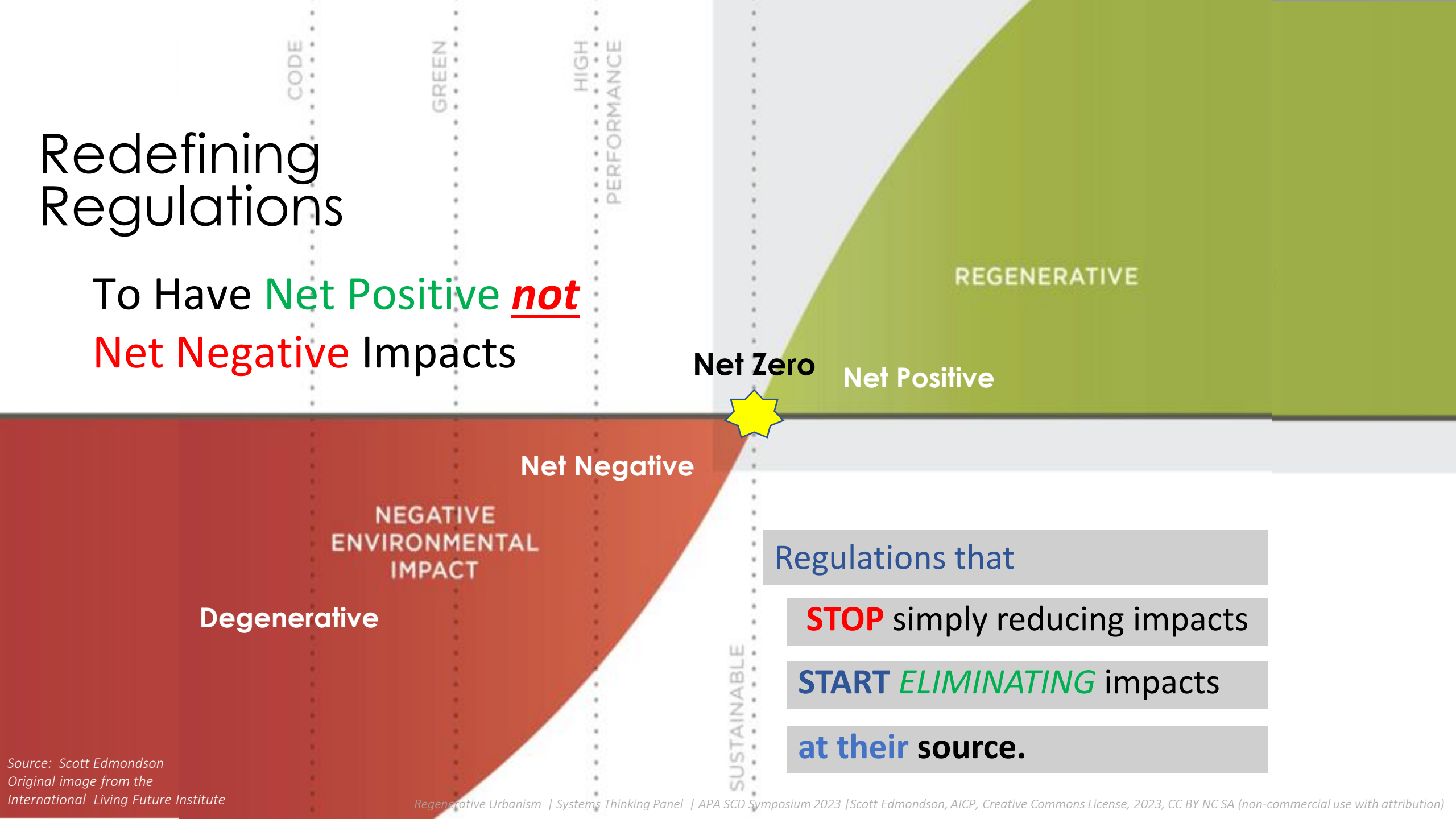
into **circular** flows that produce NO waste & use infinitely regenerated resources **by design**

While continually increasing productivity thru innovation – doing more with less

Lyle, John Tillman, *Regenerative Development for Sustainable Development*, Figures 2 & 3, 1994.

Redefining Regulations

To Have **Net Positive** *not*
Net Negative Impacts



Regulations that

STOP simply reducing impacts

START *ELIMINATING* impacts

at their source.

Source: Scott Edmondson
Original image from the
International Living Future Institute

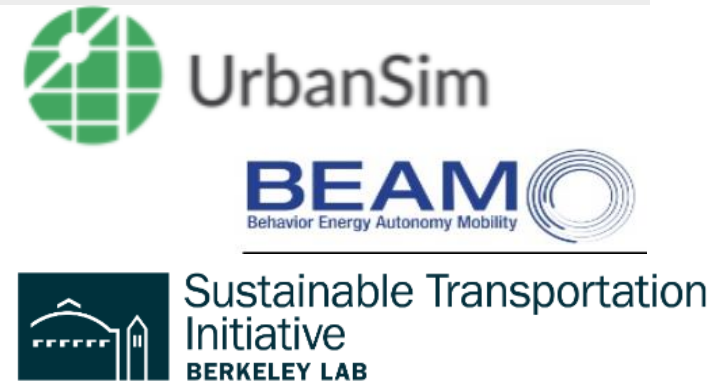
Using new GeoDesign & procedural modeling and systems simulation tools

They enable the next generation of **systems** planning and design practice

Learn, test, scale good planning, design, and sustainability practice quickly

- For regenerative living system ecological economic built environments
- For regenerative urban and regional economies, communities, and global society
- To streamline and automate the whole urban planning process for enhanced results

Some leading new tools ([link](#))



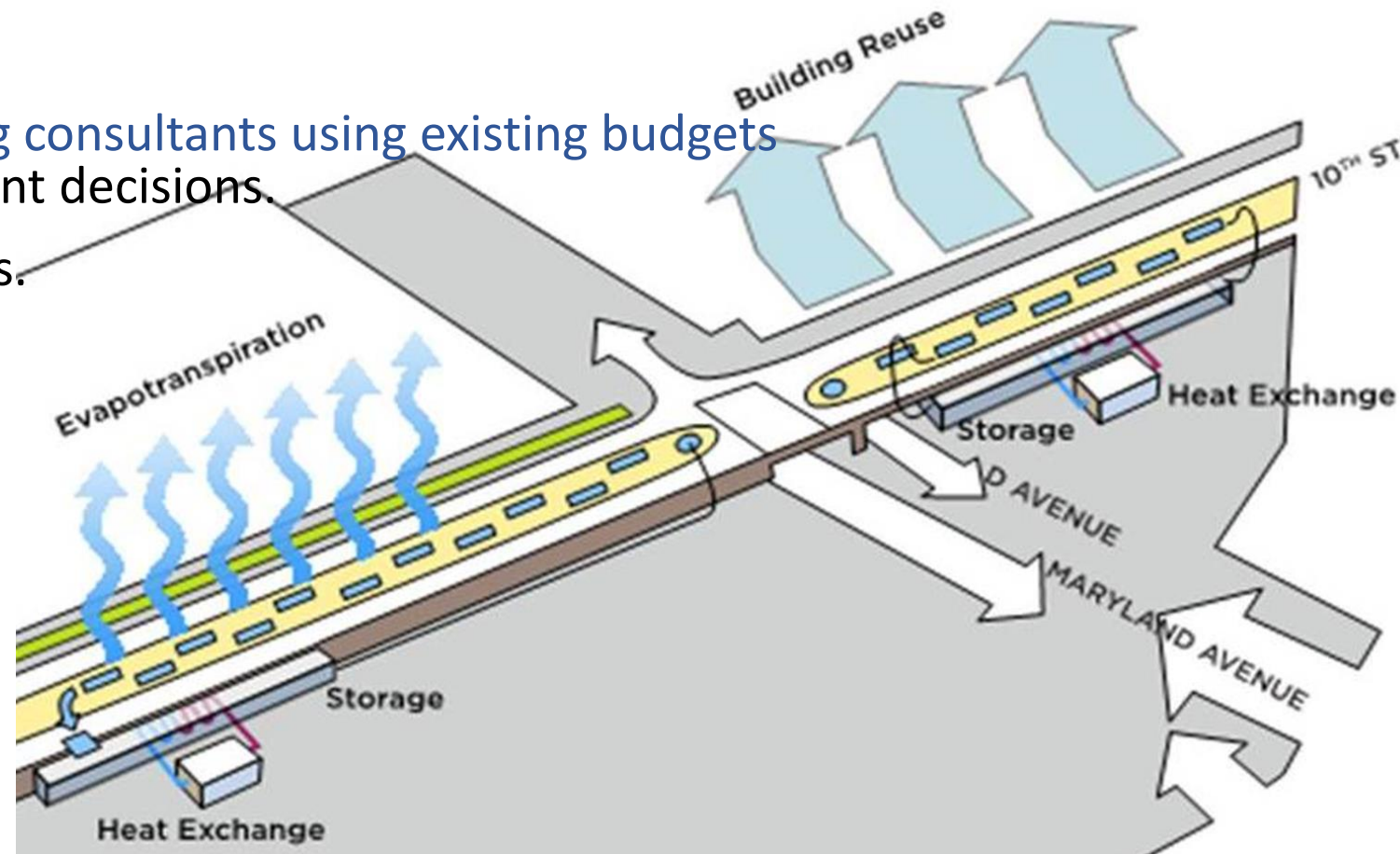
MAKING the Market for Regenerative Urbanism

Practice is ahead of the market.

We can start buying it now from leading consultants using existing budgets for maintenance, repair, and replacement decisions.

Specifying it in purchasing and contracts.

- TO integrate the performance imperatives of regenerative life support systems
- into the city metabolism & economy
- through reconfiguring the built environment and infrastructure
- with regenerative built environment technology and systems.



Graphics Credit: ZGF/NCPC

To start reconfiguring cities as regenerative life support systems.

Our Challenge: Use regenerative urbanism to create a circular regenerative ecological built environment, economy, community

Achieve living system performance imperatives.

Capture and retain energy and water.

Eliminate negative impacts

Continuously cycle material.

Produce positive impacts

We must specify and pursue the innovation & investment program that will create regenerative built environments and the larger circular ecological economy w x10+ the present production capacity, which, when scaled across city-regions globally, will create inclusive prosperity for 9B of us by 2050 having only positive environmental impacts

Restore damaged nature
Reverse climate change in time
Expand human AND natural system productivity

This is the only solution for the twin challenges of climate change and unsustainability

Three Cases

Progress towards regenerative urban metabolism and economy
from a regenerative built environment

1. Kashiwa-no-ha, Chiba Prefecture, Japan (2007+) ([link](#))
2. Central SoMa District, San Francisco, California (2017) ([Area Plan](#)) ([Study](#))
3. Albina Neighborhood, Portland, Oregon (2022) ([link](#))

Kashiwa-no-ha, Japan, Chiba Prefecture

Innovation Campus, Smart City Neighborhood (2007+)



**Largest Platinum Certified
LEED ND Plan
Meets Building & Site
Performance Guidelines.**

**(2 Jobs / Resident)
365,000 M2**

USES:

- **25% Residential**
- **13% Research**
- **50% Commercial
& Retail**
- **12% Community
Services**

Neighborhood	Linked outdoor spaces and Community Programs with Connected Smart City Technology for Community Engagement & Place Stewardship
Restoration	Green Infrastructure: Retain 95 percentile Storm Event
Community	Resilience: Mixed Use with jobs to housing ratio, 2:1
Governance	Urban Design Center innovation as a new for public-private-academic partnership collaboration to go all the way to sustainability success

Central SoMa (SF): Regenerative District TEST (2017)



- 
 BICYCLING
 自行车
- 
 OPEN AIR
 STREET CAFES
- 
 SAFE STREETS
 FOR CHILDREN
- 
 WALKABILITY
- 
 STRONG
 RETAIL BASE
- 
 STORMWATER
 MANAGEMENT
- 
 PUBLIC TRANSIT



Graphics Credit: ZGF/Regensia/City of San Francisco

5 Jobs / Resident
 3,000,000 Sq M

USES:

- 50% Residential
- 50% Commercial

4 Big Ideas:

1. District Water With Heat Exchange
2. Coordinated Blue-Green Infrastructure
3. Connected Blocks and Buildings
4. Integrated resource and material cycling

Proforma: \$2B+ market value premium from regenerative metabolism performance.

Neighborhood Restoration
 Community Governance

Linked outdoor spaces, Community Programs/
 Green Infrastructure with 100% capture of water, heat, and nutrient for reuse
 Mixed Use with jobs to housing ratio, 5:1 Jobs to housing ratio
UDC, building & site with integrated water, heat, and waste cycling

Albina Neighborhood, Portland (2022)

Highway Cover Project used to create a restorative neighborhood and equity



(1 Job / Resident)
100,000 SM
USES:
50% Residential
40% Commercial
10% Cultural

Graphics Credit: ZGF/ODOT

Neighborhood
Restoration
Community
Governance

Reconnected land use. Linked outdoor spaces activities to interior building programs.

Green Infrastructure with best management practices **for regenerative systems sustainability**

Mixed use district for **intergenerational wealth creation.**

Governing entity to restore and enhance this Black Historic Albina Community.

Call to a New Practice

Summary: Why Regenerative urbanism?

It is **the antidote** to our sustainability predicament (no success in time).

It is an **emerging systems innovation** for sustainability **success** arising organically through our **professions' innovation that needs to be fully developed** in practice.

Only approach that will establish the **economy of inclusive global prosperity in perpetuity**

- *Which, in turn, is essential for generating the collaboration needed for climate change success*
- *And a better business model*

As such, it is the **only approach** that will **simultaneously mitigate the twin challenges** of climate change **and** unsustainability, **and only for the cost of climate change!**

Best defense against the increasingly **hostile conditions** that will arise during the **100-year-long-plus** period of **climate success recalibration**.

It transforms and expands our professions' **value in a new role** that **society needs: leading society to sustainability success.**

Regenerative urbanism -- a call to a new practice capable of achieving sustainability success in time

- Shifting to (embrace, learn, practice) regenerative systems sustainability planning & design practice.
- Connecting our work to systems sustainability imperatives.
- Innovating continuously to systems sustainability performance.
- Leveraging the built environment-economy connection
 - and our new role & value proposition
 - to create the regenerative built environments underlying sustainable economies, communities, & planet.
- Testing and scaling the new practice with the new powerful GeoDesign and procedural & systems simulation planning tools.
- Using existing budgets to start funding regenerative sustainability *NOW, to jump start the shift and make the market*, instead of continuing to accelerate unsustainability.



Invitation: Join the global practice towards regenerative living systems sustainability success

Cities around the world are now innovating towards regenerative urbanism with bold programs & projects.

Please join [this path to success.](#)



REGENERATION

BURNABY, BC. Adopting an Environmental Sustainability Strategy that anchors an integrated, regenerative, and net positive community vision



ENERGY

VANCOUVER. Leading a comprehensive Renewable City Strategy committed to 100% renewable supply (including transport) using neighborhood energy utilities



WATER

BARANGAROO SOUTH DISTRICT, SYDNEY Utilizing an integrated district water system that exports surplus recycled water to surrounding communities



MATERIALS + WASTE

AMSTERDAM. Designing a local circular economy to eliminate waste, create jobs, and anchor new district developments



FOOD

SUNQIAO DISTRICT, SHANGHAI Integrating large-scale vertical farming systems within the public realm to expand regional foodshed capacities



IT / SMART CITY

KASHIWA-NO-HA, JAPAN. Managing a comprehensive Smart City program that enhances environmental performance and social cohesion



MOBILITY

VIENNA. Providing a coordinated network of emissions-free transit options that eliminate the need for personal automobiles



LAND USE + ECOSYSTEM

SINGAPORE. Employing a 'livable density' approach that integrates the built environment within natural systems




HEALTH + WELLBEING

CHICAGO. Leading a comprehensive wellbeing assessment that embeds health equity into every government agency



MGMT + GOVERNANCE

COPENHAGEN. Using an innovative public-private model to finance large-scale community regeneration projects



Is systems thinking the basis for the new approach needed for sustainability success?

Shifting from making *parts* sustainability to making **systems sustainability**

Thank You

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www.sustainability2030.com

For this slide deck and additional resources, see:

<https://www.sustainability2030.com/apa-scd-symposium2023>

NEXT Up: three presentations that dive deeper into aspects of regenerative urbanism.