Circular Economy and The Pathway to Net Zero

A High-Level Introduction for the Architectural, Engineering, Construction/Operations (AECO) and Built Environment Sector

June 20th, 2024 – 11am Webinar

BSI Group is an Organizational Member, Sponsor and Partner:

National Institute of BUILDING SCIENCES™

Speaker introductions - about us

"To eliminate the concept of waste means to design things-products, packaging, and systems-from the very beginning on the understanding that waste does not exist." — William McDonough, Architect, Cradle to Cradle

August Nazareth, Global Director, Built Environment Sector, Americas

- 10 years in the AECO/Built Environment – USA/UK
- Digital transformations/ sustainability across the building lifecycle towards smart cities, smart buildings, digital twins, AI, digital circular economy and new technologies
- MBA, Innovation, Enterprise & Circular Economy
- Publications:
- How close is the built environment to achieving circularity?
- The Building Owner's Opportunity to Disrupt the Construction and Built Environment
- LinkedIn

Rabia Charef, Researcher, Circular Economy Digitalization Expert, Architect, at Lancaster University, UK

- 15 years in the Industry – architect
- BIM in the French and UK context
- Research – BIM and the circular economy
- PhD in BIM & Circular Economy
- Standardization
- Publications: Scholar
- Book: Circular Economy for the Built Environment - Research and Practice
- LinkedIn

Some BSI Clients

A purpose-led organization

Impact for a fair society and a sustainable world

- For more than 120 years BSI has benefitted the world in a profound and unique way. Our independence, global reach and access to leading-edge experts sets us apart.
- Due to the unique way we are incorporated, we reinvest our profits to foster progress and partnership, increasing trust between consumers, governments and organizations.
- Ultimately, we help business and society thrive together accelerating progress towards a fair society and a sustainable world.

With a global presence

BSI has a presence on every continent, with 87 offices in 31 countries housing more than 6,000 colleagues

Our 84,000 clients in 193 countries range from globally recognized brands to small, local businesses

The global built environment

The global construction industry is undergoing significant changes and transformations, driven by factors such as digitalization, sustainability, and population growth.

The industry is expected to face both opportunities and challenges in the coming years, with advancements in technology and a growing focus on sustainability reshaping the way construction projects are planned and executed.

BSI's role is to support industry stakeholders across the entire built asset lifecycle, in meeting the many industry challenges enabling a digitally transformed, sustainable and safe built environment

Our focus is on key themes impacting the built environment

Sustainability and Sustainable supply Chain

- GHG/Carbon management
- Energy/Water Management
- Sustainable Materials & Products
- **Sustainable Infrastructure**

Digital Trust and Transformation

- Information and Cyber Security
- **BIM and Digital Twin**
- Smart Cities and IoT
- Digital Innovation and Technology

Health, Safety and Wellbeing

- Fire/construction Safety
- Environmental Health & Safety (EHS)
- PFAS Ecological Restoration
- Occupant Health & Wellness
- **Prioritizing People**

Quality

- Construction Products / Materials (Quality and Performance)
- Digital Circular Economy
- **Sector specific Quality Management**
- Kitemark Home

Circular economy and the pathway to net zero

AGENDA

- Circular economy influencers & schools of thought
- What is the circular economy, inspiration, and principles?
- Why the circular economy is about design, not recycling, or cradle-to-grave propositions
- Net zero and circularity, funding in the latest US Acts – IRA (370B) CHIPS Act (280B) and IIJA 1.2T
- High-level overview of business models, enablers, and digital circular economy (BIM, AI, data, etc.)
- Case studies/projects in the US/EU that show an achievable CE and pathways to net zero
- Questions
- Close

Circular economy influencers and schools of thought

- **Cradle to Cradle, remaking the way we make things** – German chemist Michael Braungart and American architect Bill McDonough, written in 2002
- **The Performance Economy** - Walter Stahel, architect and economist, Product Service Systems, not ownership
- **Biomimicry** - Janine Benyus, author of Biomimicry: Innovation Inspired by Nature
- **Industrial Ecology -** The study of material and energy flows through industrial systems
- **Blue Economy -** "100 innovations that can create 100 million jobs within the next 10 years“
- **Ellen MacArthur Foundation** - An economy designed to keep materials in use, eliminate waste and regenerate natural systems.
- **Sustainable Development Goals (SDGs)** - Number 12 in particular on safe consumption calls for circularity

But, what *is* the circular economy?

It's driven by design, based on 3 principles

- Eliminate waste and pollution, by design
- Circulate products and materials (at their highest value)
- Regenerate nature

*"an industrial system that is **restorative** or **regenerative** by **intention and design**. It replaces the '**end-of-life**' concept with **restoration**, shifts towards the **use of renewable energy**, eliminates the **use of toxic chemicals**, which impair **reuse**, and aims for the **elimination of waste** through the **superior design of materials, products, systems**, and, within this, **business models**".*

- Circular Economy valued at 4.5T by 2030 – Goldman Sachs

PhotoCredits: Pexels.com

Sources: Ellen Macarthur Foundation, WeForum, Digital Circular economy
Rabia Charef – PhD BIM & Circular Economy – 24/05/2022

And why *NOW*?

Circularity is included in the latest US legislative Acts – Inflation Reduction Act, CHIPS and Science Act, and Bipartisan Infrastructure Law worth Over 1 Trillion

Recirculating Materials:

CHIPS Act reduces pressure on resources like EV batteries and clean energy tech

Federal Buy Clean Initiative:

Develops cleaner production & recycling for materials like steel and concrete

Extending Lifecycles:

Saves resources, reduces waste, lowers GHG emissions

Creating New Jobs & Industries

Enhance community resilience

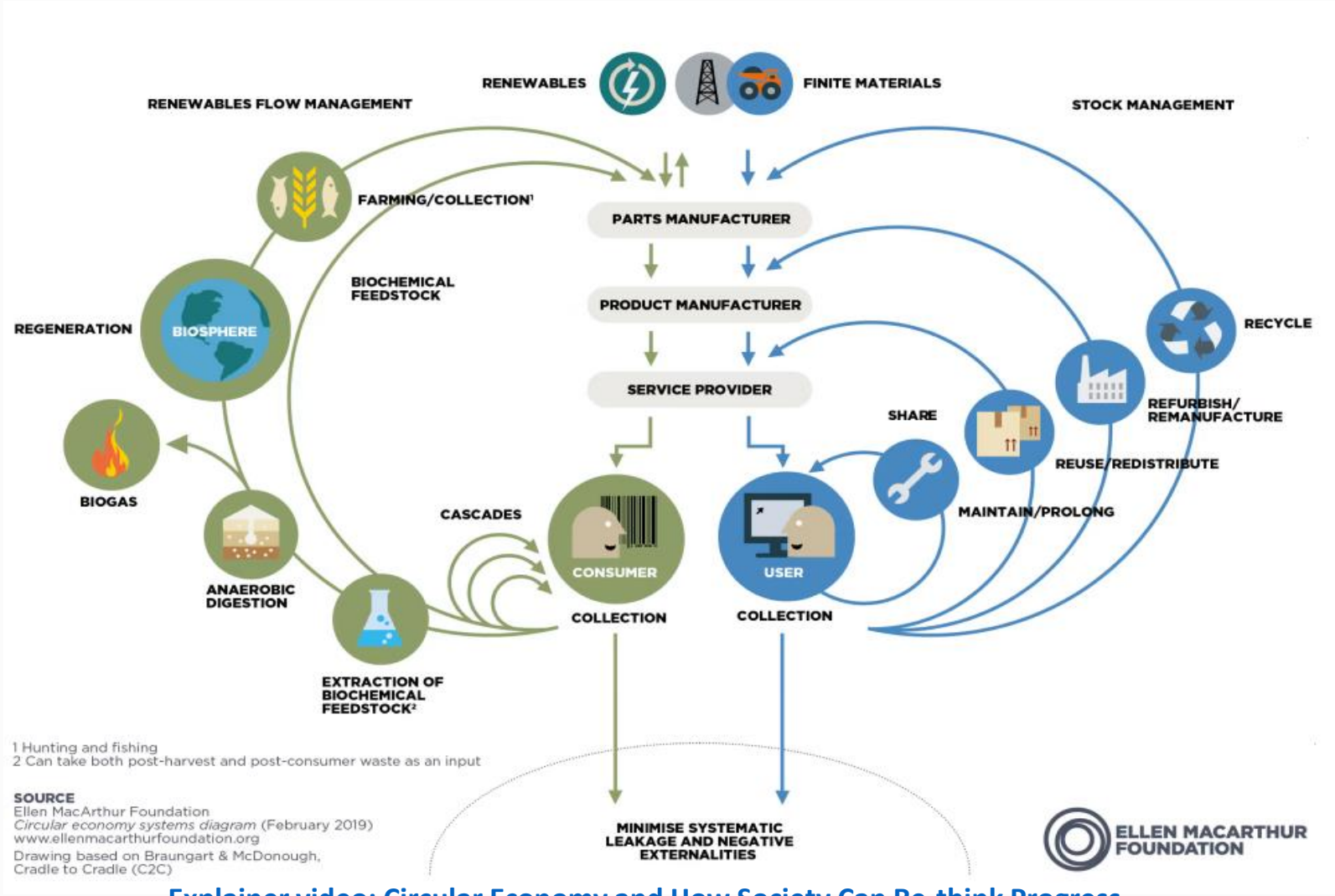
Net-Zero Game Changers

Collaboration between government agencies, industry, and academia on research

The Takeaway:

Circularity is written into these acts (legitimizing CE) and funding is available

Visualizing the circular economy systems approach - the CE Butterfly



Links to firms with business models for reverse logistics and take-back systems – Old tile becomes new tile, and similarly, carpeting

Armstrong CEILING & WALL SOLUTIONS

ShawContract

Tarkett

[Explainer video: Circular Economy and How Society Can Re-think Progress]

Biomimicry - the forest

A perfectly designed eco-system for carbon sinks, vegetation, animals, pollinators, water systems, fungi, bacteria and mycorrhizal networks, soil preservation and regeneration.

- There is no waste in Nature & everything equals food for something else
- A cradle-to-cradle closed-loop system
- A circular economy seeks to mimic nature at its most symbiotic level *by design. Not optimize waste <u>after</u> it's been designed into systems, buildings, and products.*

Photo credits: Pexels.com

Biomimicry - the humble banana

- Entire product is usable by all consumer markets as well as business-to-business applications for nutraceuticals, etc.
- perfectly designed package for mobility, life stage information, ease of use and nutrition
- In a landfill, bananas facilitate decomposi of adjacent organics

There is no waste in Nature – By Design

"Businesses throw away hundreds of billions worth of valuable materials because they are not designed for recovery. What is gained on the front end through convenient bonding is lost on the back end through destructive mixing of materials that degrades their quality." - Mulhall and Braungart

Sources: Banana peels as a bioactive ingredient and its potential application the food industry
Recovery of Banana Waste-Loss from Production and Processing: A Contribution to a Circular Economy

Photo credits: Pexels.com

How we currently design products for *us*

"You don't filter smokestacks or water. Instead, you put the filter in your head and design the problem out of existence."–
William McDonough, Architect

Photo credits: Pexels.com

Valuable materials discarded through poorly designed processes for recovery or remanufacture and re-sale

Negative externalities for communities unrelated to the original creator/ designer, thousands of miles away.

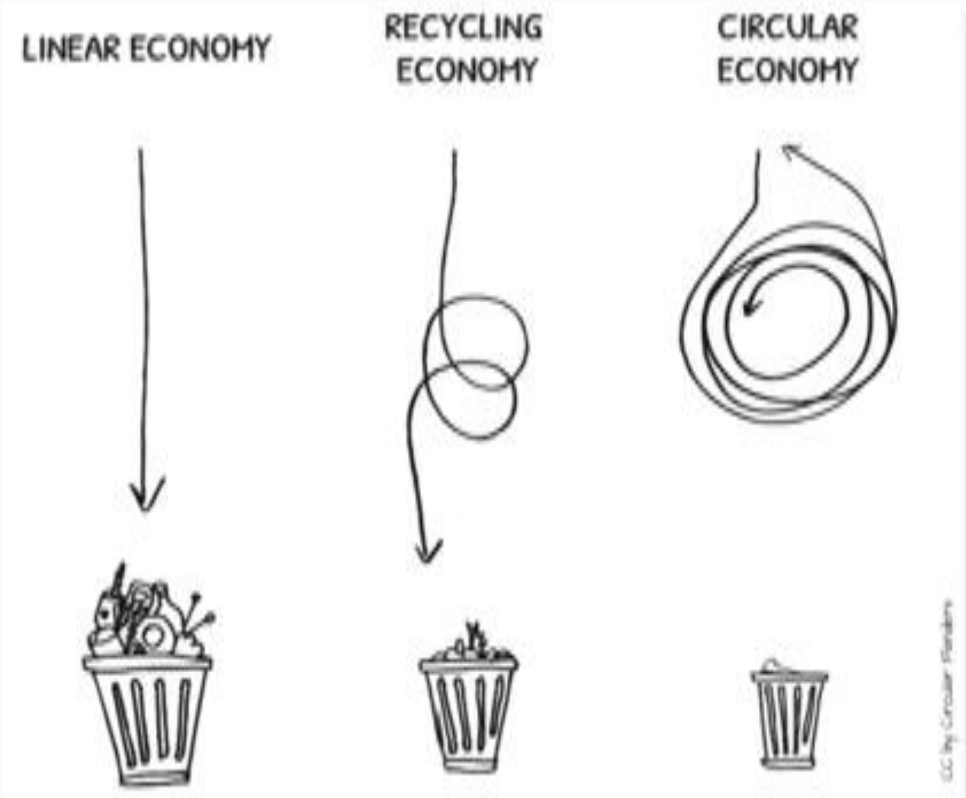
Long-term risk of finite resources

Viability and negative branding impacts

Video: [The Origins of the Linear Economy | Seeing the Bigger Picture, EMF]

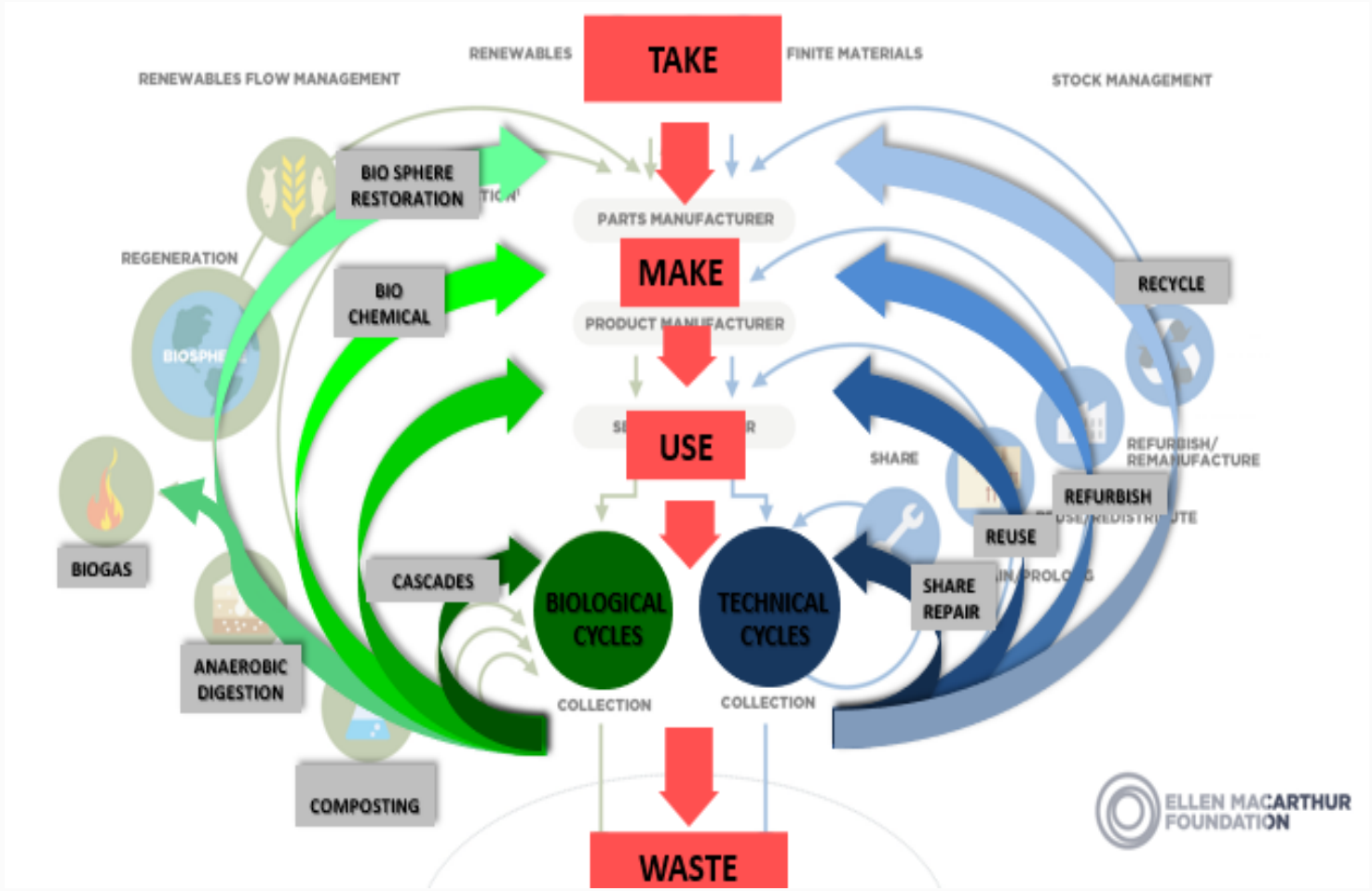
What is the linear economy?
A dichotomy – good and not-so-good!

Photo credits: Pexels.com



[Explainer video: Circular Economy and How Society Can Re-think Progress]

The linear economy and circular systems illustrated together – A net zero opportunity for change



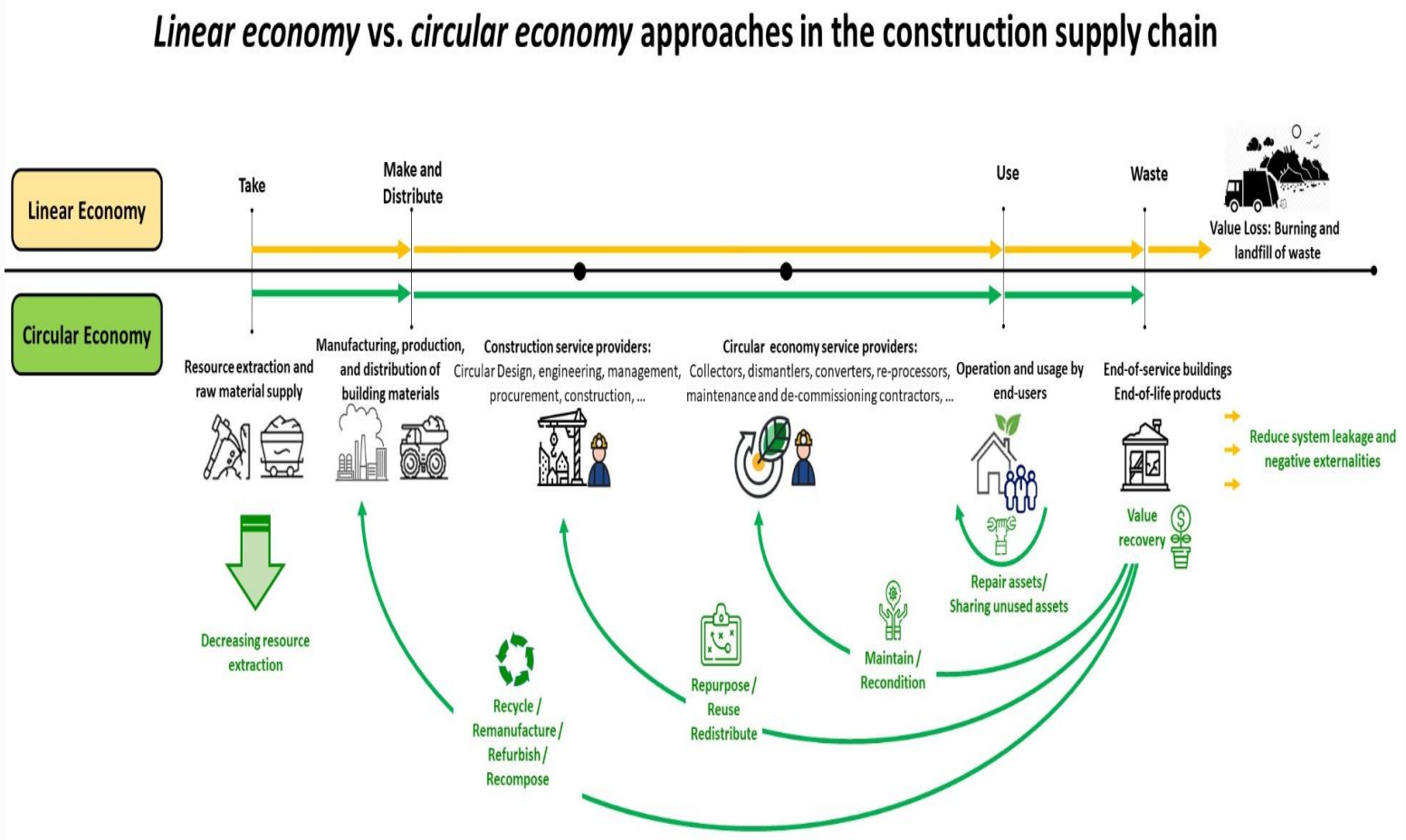
RECYCLING IS A LINEAR ECONOMY OPERATION

"In a properly built circular economy, one should rather focus on avoiding the recycling stage at all costs. It may sound straightforward, but preventing waste from being created in the first place is the only realistic strategy."
- World Economic Forum

Video: [It's time to rethink everything](), EMF

Source: Rabia Charef – PhD BIM & Circular Economy – 27 Mai 2024

Circular construction approach – linear and circular



Video:
[Humans Changed the Face of the Earth, Now We Rethink Our Future](#)
EMF

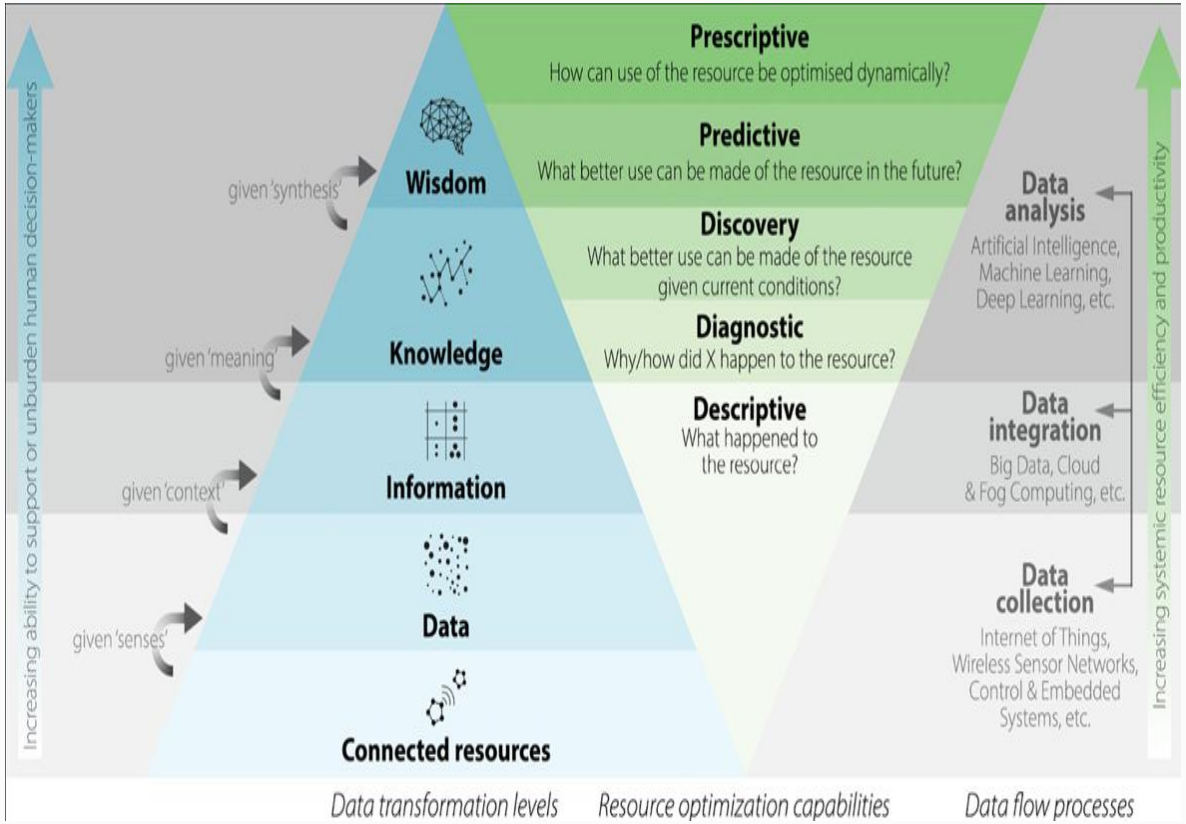
"If I had asked the public what they wanted, they would have said a faster horse."
Henry Ford (1863 – 1947), Founder of Ford Motor Company

Source: Scholartop,Wikimedia.org creative commons

Business models and enablers for a circular economy and sustainability in the built environment rely on design, data and information

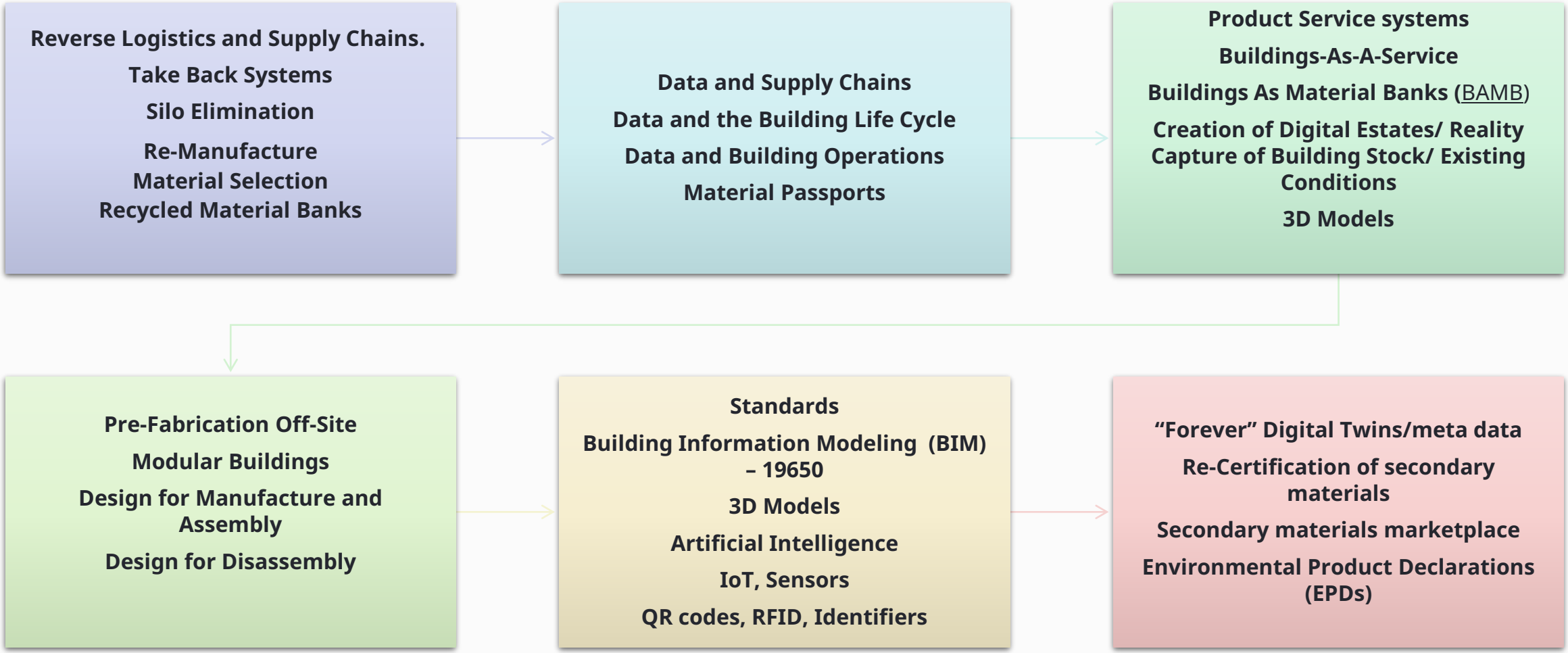
Digitally enabled circular economy for AECO/built environment

- A smart circular economy framework establishes links between digital technologies and sustainable resource management.
- Tracking, materials passports, managing material life cycles, locations, manufacturers, environmental product declarations, etc. becomes critical for future considerations with ESG Scope 1, 2 and 3. And Extended Producer Responsibility, regulation and compliance.
- Digitalization like BIM makes possible future use of new technologies leveraging data and analytics to optimize functionality, usage intensity, maintenance, location visibility, as well as reverse logistics to **supplier feedstocks.**
- Digital Twins, 3D models, Building Information Modelling Training, Asset Management, Universal Standards, AI, Internet of Things, Sensors, etc.
  - **Recommended reading referenced in webinar:**
  - Buildings As Material Banks (BAMB),
  - Buildings as material banks using RFID and building information modeling in a circular economy - ScienceDirect



Source: Wikipedia.com

Business models and enablers for a circular economy and sustainability in the built environment rely on design, data and information



Case study 1 – Circl, Amsterdam

- Use of Reclaimed Materials - including wood, steel, and glass
- Circular Design - a green roof, rainwater harvesting system, and composting toilets
- Energy Efficiency - insulation made from recycled denim, smart heating/cooling/lighting
- Supply Chain - circular firms chosen at the design stage
- Innovative Construction Techniques - modular construction and prefabrication
- Collaborative Approach - including architects, builders, supply chain and tenants
- The Making of Circl – A very interesting case study because it includes the decision points and arguments between the teams.
- Such as….*During the brainstorm sessions, the architect had occasional doubts about whether the new design wouldn't be too 'rugged' for the bankers. At a certain point, he suggested painting the beams white to create a more refined look. But that would have involved unnecessary paint and, moreover, make it more difficult to reuse the beams.*

Photo credits: Circl

Case study 2 – Ford Rouge Center, Dearborn, MI

- Use of Reclaimed Materials - including wood, steel, and glass
- Circular Design - rainwater harvesting, natural ventilation, and a 10.5 acre living roof
- building materials were selected for their environmental performance and ability to be safely recycled or reused at the end of their useful life
  - Roof membrane is fully recyclable and C2C certified
  - Steel used in building structure sources are recycled
- Challenges - balancing the environmental performance of the building materials with the cost and practical considerations of the construction process
- Early Design Decisions incorporate cradle to cradle considerations
- Within five days of the roof going down, local killdeere had nested and laid their eggs in the sedum
- Ford Rouge Center Master Plan

Photo credits:Mcdonoughpartners

Rabia Charef

Researcher, Circular Economy and

Digitalization Expert, Architect

– Lancaster University, UK

4 case studies from Europe

UNBALANCED SYSTEM

Standard of living

Consumer society

Need for housing

Population growth

Supply

Demand

© Rabia Charef

How can we continue to grow

within the alarming equation of resource depletion, waste generation

and gas emissions?

How could we be part of the solution instead of part of the problem?

DO MORE WITH LESS

Rethink

Strive for Sobriety

Question our needs

Buildings = material banks

Need for housing

Population growth

Supply

Demand

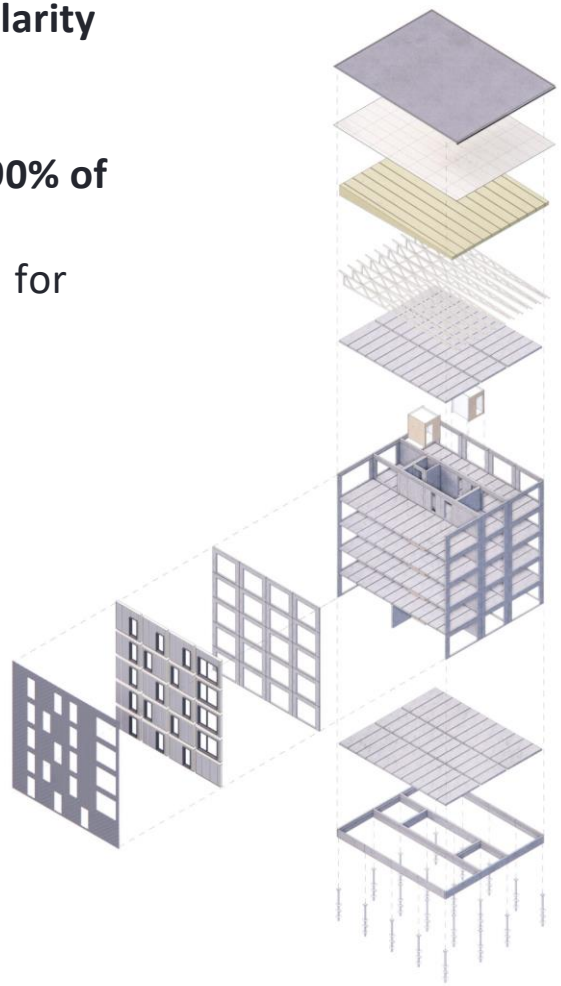
1- DESIGN FOR DISASSEMBLY

THE CIRCLE HOUSE

The Circle House (DEN)
Architect: 3XN Architects, Lendager Group, Vandkunsten
Main Partners: Lejerbo (Client), GXN Innovation, MT Højgaard, Danish Building Research Institute (SBi), The Danish Association for Responsible Construction.

- ❑ First social housing project in Denmark, built according to **circularity principles**, designed to be **dismantled.**
- ❑ 60 social housing units completed by **2020**
- ❑ **Goal:** to demonstrate the possibility of designing houses with **90% of materials reusable without loss of value**.
- ❑ In this project, **several construction systems** used are designed for **reusability, disassembly and sustainability.**

© RUM – architecture in a circle of sustainability



- ❑ **Precast** concrete elements
- ❑ Beams with **mechanical joints**
- ❑ **Modular** building systems, etc.

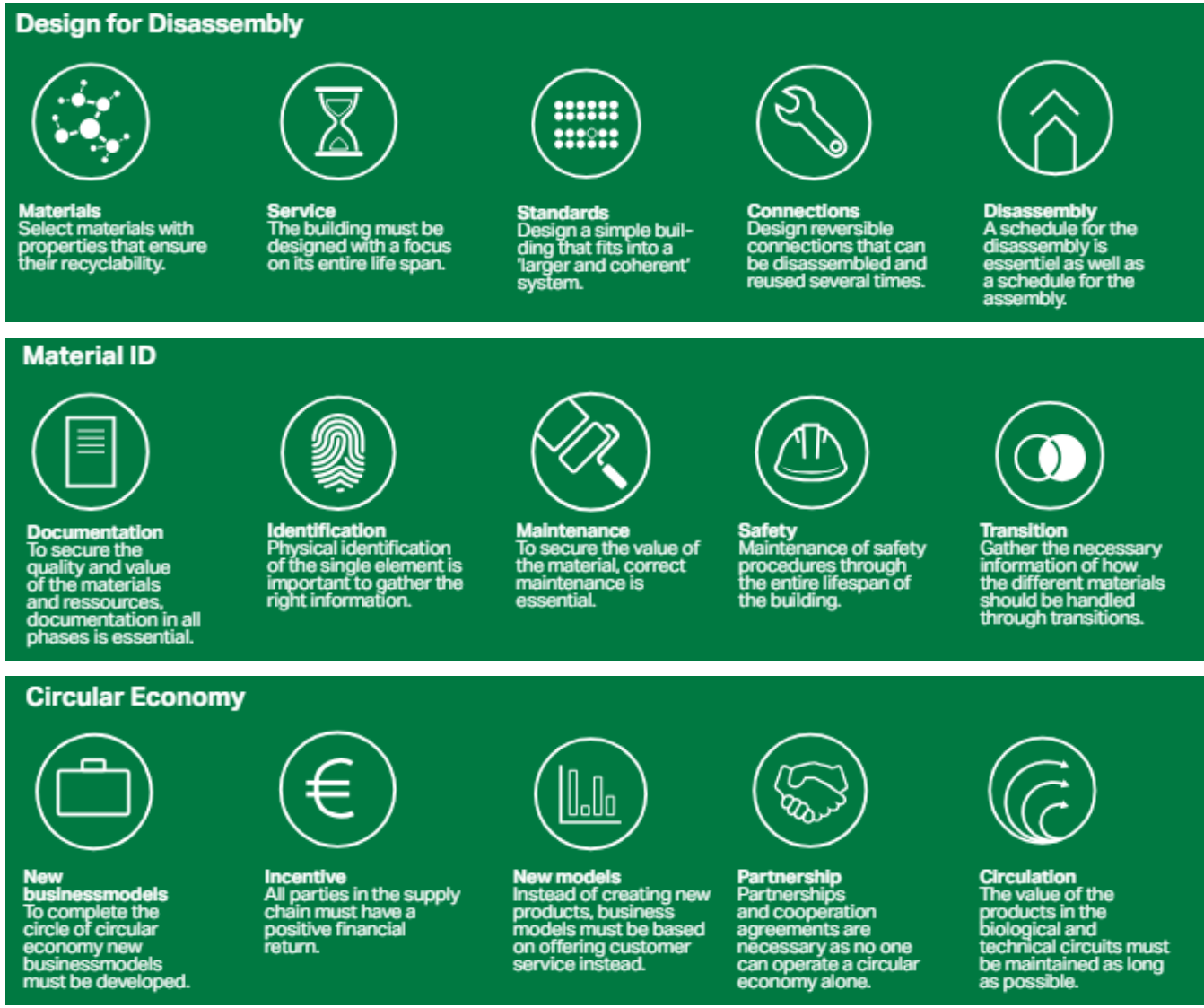
- Showcase the **feasibility of circularity** in architecture
- Contribute to a **reduction in carbon footprint**
- Promote **circular economy practices** within the construction industry.

1- DESIGN FOR DISASSEMBLY

THE CIRCLE HOUSE STRATEGY

- **Several stakeholders** were involved during the design phase:
  - 4 firms for a collective design office,
  - Building contractor,
  - Engineers,
  - Demolition experts,
  - The city of Aarhus.
- Involvement of companies for Circle House: **30 companies.**
- Adjustments to construction **business models**.

Guidelines and strategies for implementing reuse and circular economy in the building industry: 15 principles.



85 to 90% of today's buildings
are expected to still be in use by **2050**

Urgent need to **extend** their lifespan
Consider buildings as **Material Banks**

2- RETAIN, REFURBISH AND REUSE

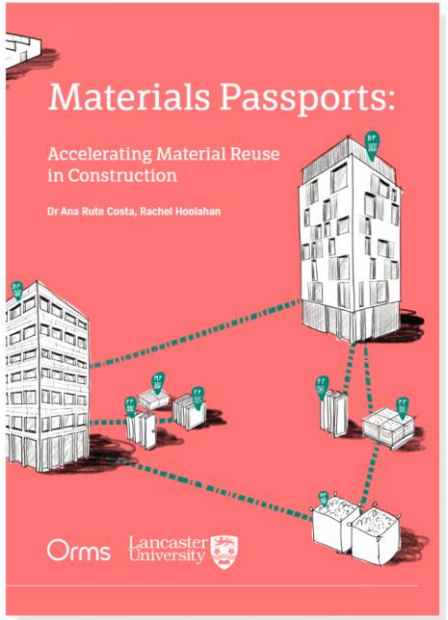
Orms ARCHITECTURAL PRACTICE

- Located in **London, Different** sectors
- Approach: **retain, refurbish and reuse**
- **Measure the** environmental **footprint**
- Committed to achieving **Net Zero**

Orms

"We create an architecture that listens."

Opensource methodology :
Material Passport for existing buildings



A Policy Paper with recommendations
Using Materials Passports to accelerate material reuse.

2- RETAIN, REFURBISH AND REUSE

Architect: Orms - London
Client: The Crown Estate

10 SPRING GARDENS – CLEAR BRIEF

- ❑ **Retain** the existing structure
- ❑ **Refurbish** interior/exterior
- ❑ High-quality **contemporary** office space
- ❑ Prioritize the **reuse of existing materials**
- ❑ **Improve** the building's performance
- ❑ **Support** research initiatives

REFURBISHMENT POTENTIAL

- ❑ **Building Condition Inspection (BCI**) :
- ❑ **Reuse Viability Assessment Report (RVAR)**:

Pre-redevelopment and pre-demolition audits

- Establish the refurbishment framework
- Identifying the value of existing materials
- Inform the brief

© Orms Designers & Architects Ltd

2- RETAIN, REFURBISH AND REUSE

SUSTAINABILITY PRINCIPLES

- ❑ Reuse of Existing Materials (structure)
- ❑ Use of recovered materials (bricks, sanitaryware, feature lighting and furniture
- ❑ Waste Minimization and Material Recycling
- ❑ Design for Disassembly and Future Reuse
- ❑ Improve the Building Performance
- ❑ Engagement with Suppliers (Future Reuse Initiatives)
- ❑ Innovative HVAC Solutions

CHALLENGES TO OVERCOME

- ❑ Trade the recovered materials
- ❑ Reuse of Materials (technical requirements, Regulations, aesthetic Specifications
- ❑ Procurement and Program Impacts
- ❑ Waste Management and Storage
- ❑ Market Limitations

BENEFITS

Lower embodied carbon
Waste minimization

Reduced material costs
Potential maintenance savings

Design for disassembly
Material passports

3- WASTE AS A CONSTRUCTION MATERIAL

"L'Orangerie" - OFFICE BUILDING

- **Seismic/flood** zone
- 1000 m² - **Office building**
- **Excavation earth** used as construction material (**waste**)
- **Contemporary** expression for an earthen building
- 11 m high
- Demonstrate that it is **possible**

3- WASTE AS A CONSTRUCTION MATERIAL

CONSTRUCTION METHODS

- **Facades:** rammed-earth bocks (earth + water + compression)
- **Pillars:** 1.40 x 0.8
- Foundation: reinforced concrete
- **Stone base** 1.8m (flood)
- **Onsite prefabrication**
- **Main Material** used: earth, water, wood, stone.
- **Finishing works**: no plasterboard, no paint
- **Use of cement**: limited to foundations

"A structure as an inseparable whole"

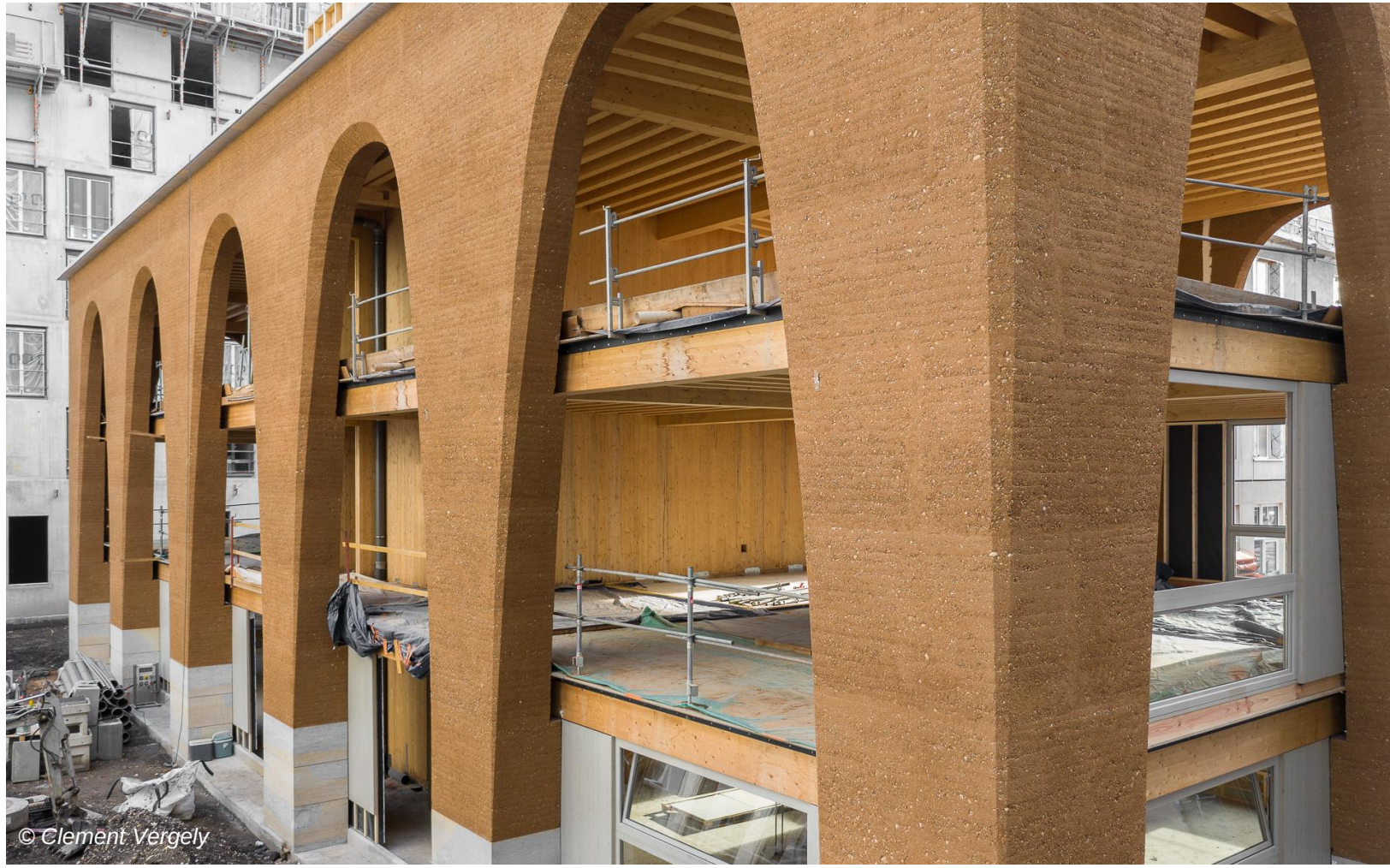
3- WASTE AS A CONSTRUCTION MATERIAL

CHALLENGES

- ❑ **Non-standard** material
  - Unusual construction system
  - Lack of appropriate regulations
- ❑ **Prefabrication** on-site
  - Storage space
  - Rain protection
- ❑ **Erosion**: sharp edges smoothed
- ❑ Rammed-earth: **Lack of confidence**

- ❑ Different **project organization**
  - Different roles/responsibilities
  - **Mason** involvement in the **design phase**
- ❑ **Specific design**
  - The design must be **adapted to the material**

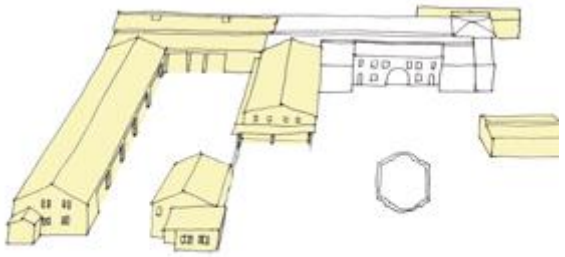
“Moving the project from "inconceivable" to "achievable" and then built”.



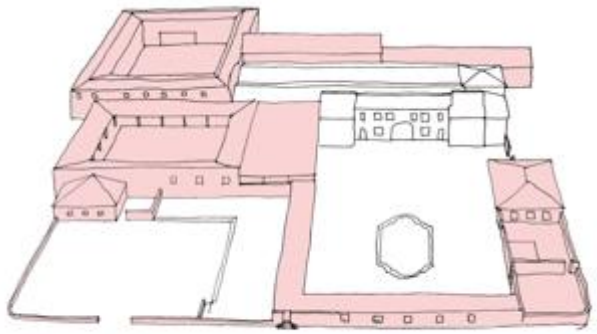
4- BUILDING TOGETHER WITH THE SITE MATERIAL

BEAUCASTEL WINERY

- One of the finest wines in France is produced
- Domain **evolved** since its inception in the **17th Century**
- **Transformative renovation**: growing activities
- Architectural c**ompetition**: **1200** entries-**32** countries
- Studio Mumbai - Studio Méditerranée
- 4000 sqm
- 130 hectares of vineyards



Deconstructed buildings



New construction

4- BUILDING TOGETHER WITH THE SITE MATERIAL

"Architects do not shape materials; they follow where materials lead." *(Tim Ingold)*

THREEFOLD OBJECTIVES

- ❑ **Enhancing** vinification and **storage** capacities
- ❑ Implementing **sustainable practices**
- ❑ Elevating Beaucastel's **brand image**

PHILOSOPHY AND APPROACH

- ❑ **Building together** = Collaborative and respectful material understanding
- ❑ They see materials as **active collaborators**, not just resources.
- ❑ Echoing Tim Ingold who considers **materials as partners** in a **creative dialogue** ("Making" masterpiece).
- ❑ The **uniqueness** of each material in its context.
- ❑ Architects as **enhancers** of natural processes

Domaine de Beaucastel, (FR)
Architects: Bijoy Jain / Studio Mumbai
Louis Antoine Grego / Studio Mediterranée
Structural Engineers: Batiserf
Mason: xx

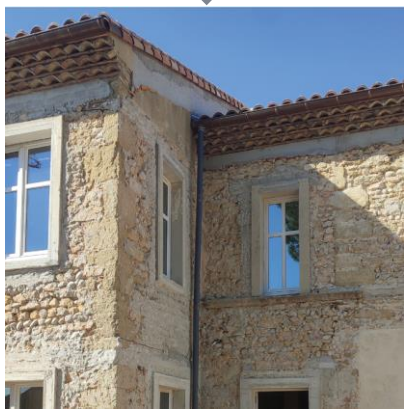
4- BUILDING TOGETHER WITH THE SITE MATERIAL

SITE MATERIALS CORPUS

"Building upon the materials and history of its predecessors" *(Louis-Antoine Grego)*

1 **Type A - "Natural" Site Material**

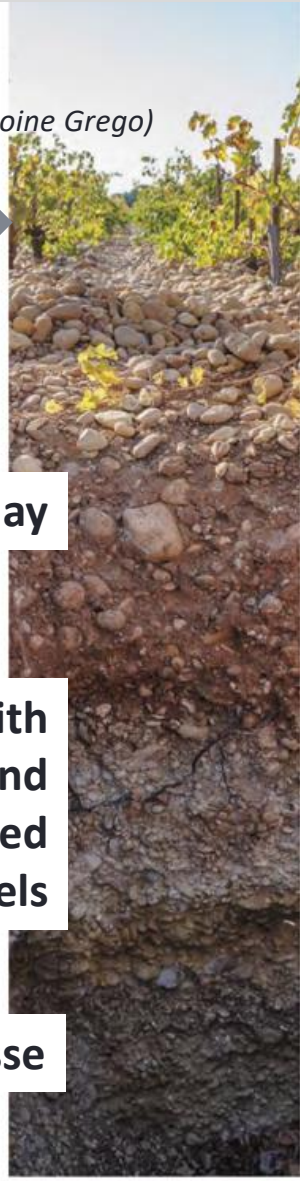
2 **Type B - Human-Introduced Site Material: 3 main periods**



Period 1
17th Century to 1900

Period 2
1900 to 1970

Period 3
1980 to 2010



Earth with red clay

Clayey sands with pebbles and limestone rolled gravels

Safe yellow molasse

4- BUILDING TOGETHER WITH THE SITE MATERIAL


© Louis Antoine Grégo

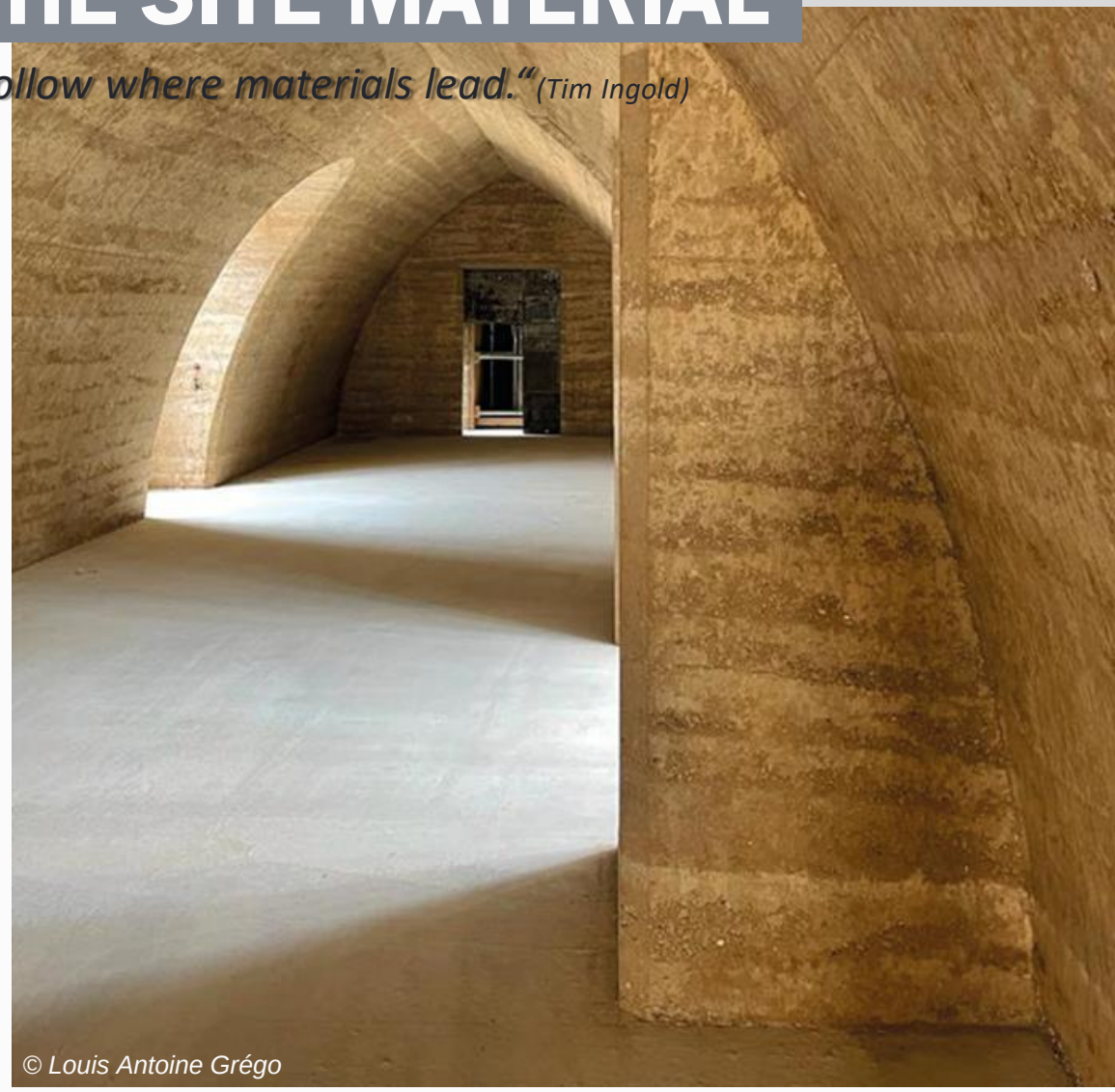
"Architects do not shape materials; they follow where materials lead." (Tim Ingold)

80%

Site materials


© Louis Antoine Grégo


© Louis Antoine Grégo


© Louis Antoine Grégo

SOME CIRCULAR ECONOMY CHALLENGES

CONSTRUCTION SECTOR

- The **non-digitalized** sector
- Lack of **information on feasibility** (implementation of the deconstruction process)
- Lack of appropriate **technical knowledge**
- Deconstruction and reuse operations: **costly** and require **more time**

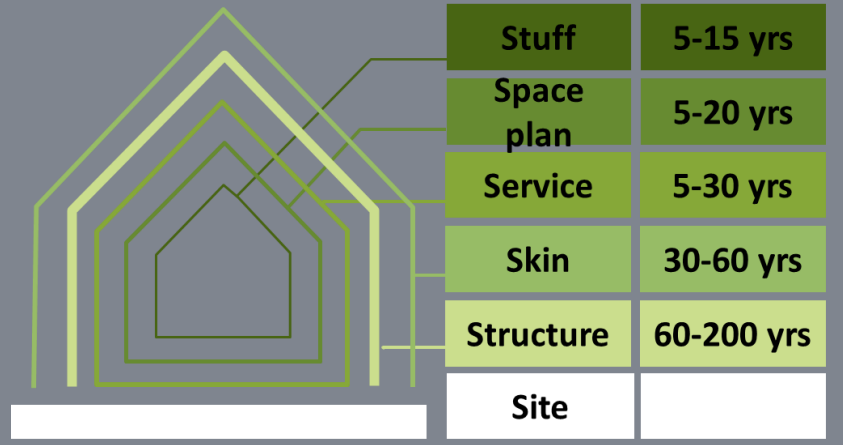
BUILDING

- Lack of **capacity to dismantle** buildings
- Lack of **reversibility/adaptability** of buildings

MATERIAL - COMPONENTS

- The **scarcity of information**: potential valorization/reuse of existing buildings
- Poor knowledge of the **composition** of materials and products
- Quantity/quality of recovered materials: **imbalance** between **supply and demand**

RECOMMENDATIONS



Adapted from Steward Brand

1. Promote **awareness and education**
2. Develop circular design **guidelines**
3. Develop **incentives** for Circular Practices
4. Support and align **research with practitioner needs**
5. Develop **standards** and **certification** and **labelling schemes**
6. Develop **assessment and measurement** methods to **avoid greenwashing**
7. Provide **regulatory support** and adopt **circular procurement**
8. Demonstrate the feasibility through **pilot projects**
9. Apply **digitalisation meaningfully** (rebound effect danger)
10. Keep in mind the Brand's Layers Theory: **Long-term thinking** and **consequences**

REMEMBER ... ***Sometimes, a low-tech approach is the best solution.***

We hope we've sparked your curiosity!

- We've discussed what circularity is, contrasted it with the linear economy and how to translate it for the built environment
- From a practical perspective the case studies show how others have re-designed projects, without a "CE" label in some instances
- Lastly, we've highlighted the immense opportunity and funding that exists to participate in one of the greatest challenges of our time – **Climate Change**

"We are the first generation to fully face the impact of climate change and the last generation that can do something about it". **Barack Obama**

Questions? Thank you for attending!

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r.charef@lancaster.ac.uk Or LinkedIn

Appendix

Circular economy and the pathway to net zero

Links, videos, references from the presentation

- What is a circular economy? | Ellen MacArthur Foundation
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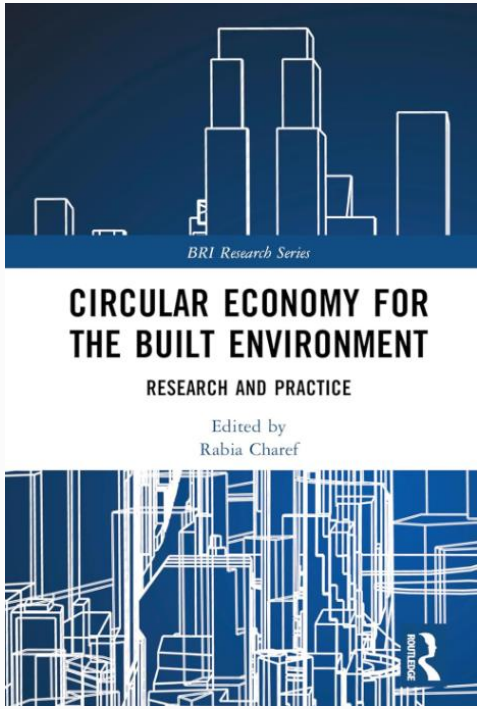
- The Origins of the Linear Economy | Seeing the Bigger Picture, EMF
- Humans Changed the Face of the Earth, Now We Rethink Our Future , EMF
- CSRD's circular economy: Reshaping corporate resources | BSI America (bsigroup.com)
- Responsible Consumption and Production in the Food Sector: Implementing a Circular Economy
- The Power of Nature at COP27 | OSTP | The White House
- U.S.-Innovation-to-Meet-2050-Climate-Goals.pdf (whitehouse.gov)
- FACT SHEET: Biden-Harris Administration Makes Historic Investment in America's National Labs, Announces Net-Zero Game Changers Initiative | The American Presidency Project (ucsb.edu)
- National Definition of a Zero Emissions Building | Department of Energy
- Ford Rouge Center Landscape Master Plan - William McDonough + Partners
- The Making of Circl
- https://plasticoceans.org/interview-with-the-blue-economy-author-gunter-pauli/
- GS SUSTAIN The evolution towards a Circular Economy (goldmansachs.com)
- The Power of Sustainability and Circular Economy | BSI America (bsigroup.com)
- Enhanced Due Diligence | BSI America (bsigroup.com)
- BSI Remediation Program Management services | BSI America (bsigroup.com)
- Sustainability and CSR consulting practice | BSI America (bsigroup.com)
- How close is the built environment to achieving circularity?
- The Building Owner's Opportunity to Disrupt the Construction and Built Environment
- Buildings as material banks using RFID and building information modeling in a circular economy
- Buildings As Material Banks (BAMB)
- Photo Credits: Pexels.com
- Our Partners:

References

- **Charef, R**. (Ed.). (2024). *Circular Economy for the Built Environment: Research and Practice* (1st ed.). Routledge
- ***Grégo, L. A.*** *(2024), Chapter 8, Building together with the site materials: a practitioner's perspective.*
- ***Pele-Peltier, A. and Goizauskas, J.*** *(2024) Chapter 9 Towards a situated understanding of challenges in the design and construction of circular earth buildings: the case study of an office building in France.*
  Costa, A. R., Hoolahan, R., Martin, M. *(2024), Chapter 11, Accelerating material reuse in construction: two case studies: one life, multiple cycles, a longer life.*
- ***Smith, J., & Johnson, R.*** *(2023). How Can Existing Buildings with Historic Values Contribute to Achieving Emission Reduction Ambitions? Sustainable Architecture Journal, 10(2), 123-140. https://doi.org/10.1234/saj.2023.10.2.123*
- ***GXN****. (2018) Circle House: Denmark's first circular housing project. KLS PurePrint. Retrieved from http://grafisk.3xn.dk/files/permanent/CircleHouseBookENG.pdf*

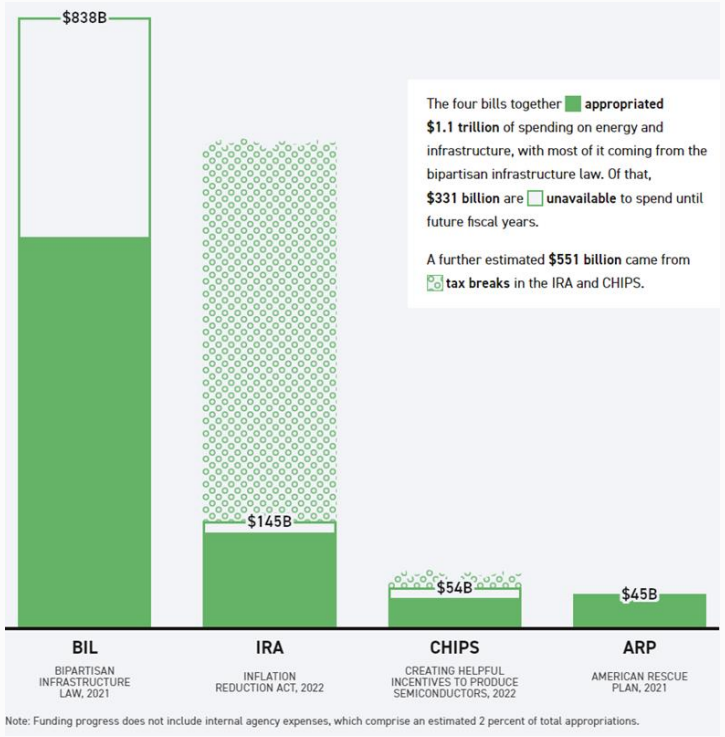


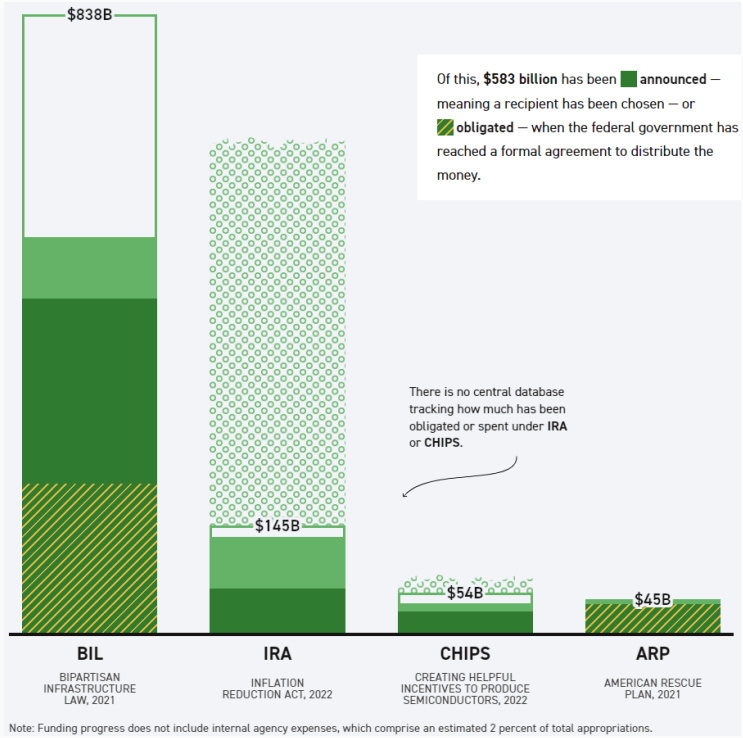
How does circularity contribute to net zero & zero waste?

1. First, Net zero refers to the point at which global human-caused greenhouse gas emissions, including carbon dioxide and methane, released into the atmosphere are balanced by *an equivalent amount* removed from the atmosphere.
2. Our activities create these greenhouse gases.
3. The pathway to net zero is to balance GHGs added into the atmosphere. The circular economy seeks to reduce GHGs by reducing the extraction of virgin materials, keep products/buildings in use for much longer, while regenerating our natural resources.
4. To do this we need to re-think how we design buildings, products, process.

The legislative Acts - opportunity to participate in one of the greatest challenges of our time – climate change.

BSI helps guide organizations to achieve net zero, circular economy, sustainable supply chains, digital trust/security, and environmental, health and safety (EHS) through consulting, knowledge, product certifications and of course, standards

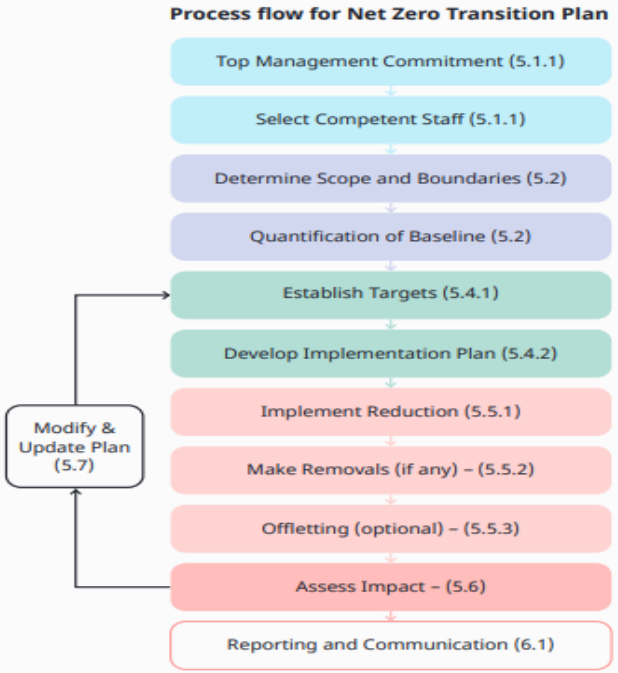




- Still more to spend …
- Only $125 billion has been appropriated from the IIJ Act
- A phased funding release means opportunity to get involved over time

Carbon Management: 10 Steps we recommend (get the report)

BSI helps guide organizations to achieve net zero, circular economy, sustainable supply chains, digital trust/security, and environmental, health and safety (EHS), building safety programs, ecological restoration through consulting, knowledge, product certifications and of course, standards

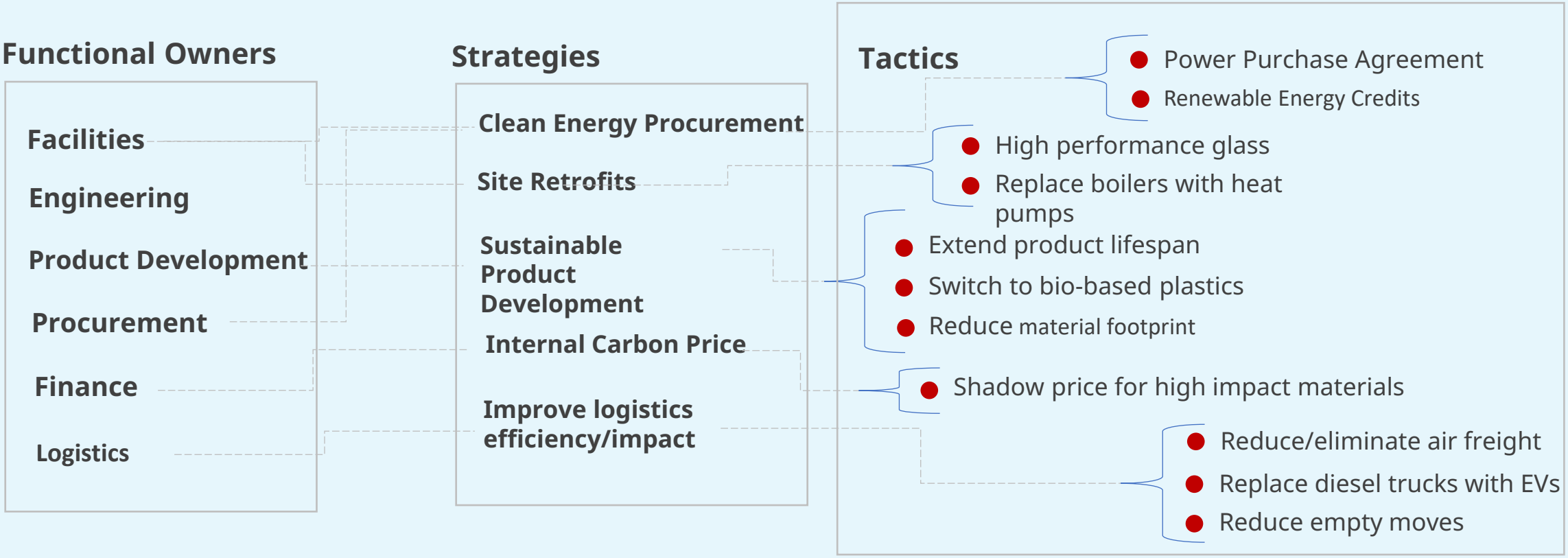


- PAS 2080:2023 Carbon management in Buildings and Infrastructure Verification (client guide to assessment)
- Carbon Management in Infrastructure and Built Environment - PAS 2080
    - PAS 2080 specifies the requirements for the management of whole-life carbon in buildings and infrastructure.

Potential carbon reduction plan

Selection of GHG Reduction Strategies (Phase 3)

EXAMPLE



30-year challenge - clean sheet design – *what would you do?*

A client wants us to design a new development that generates no waste for 30 years of its existence.

- They insist we start from scratch
- We're to design what will be the new standard of sustainable zero waste, net zero structures
- We need to track all our materials
- We need to make changes to our systems without generating waste
- We determine a way to preserve all project, materials, and production knowledge for 30 years
- Additionally, no disposable elements during design, construction or operations

Some circular economy building blocks that can help achieve zero waste in the built environment, including:

- Building Information Modelling (BIM), 3D Models, AI, Standards/Frameworks
- Material Passports
- Buildings as Materials Banks and Product Service Systems
- Pre-Fabrication and Design for Manufacture and Assembly
- Designing for disassembly and reuse
- Using recycled or renewable materials
- Incorporating passive solar design and energy-efficient systems
- Designing for adaptability and flexibility
- Implementing waste reduction and management strategies
- Industrial symbiosis
- Industrial Ecology, Biomimicry,
- Inspiration: Circl, Amsterdam - The Making of Circl

Clean Sheet Design: Used in innovation by firms like IDEO, Frog, Tesla, Apple

Thank you!

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