R3FRAME

Circular Economy strategy FRAMEwork for sustainable SMEs

IO3: Circular Economy Implementation Framework (CE Framework)

Disclaimer:

Project Agreement No. 2020-1-EL01-KA202-078870

Co-funded by the Erasmus+ Programme of the European Union

5.3 Construction Industry

The **Construction Industry** includes the construction (erection), maintenance and repair of:

- buildings: residential, industrial, institutional, commercial, and other immobile structures
- infrastructure and heavy constructions: roads, highways, tunnels, bridges etc.
- service facilities that are integral parts of structures and are necessary for their use.

The construction sector has recently attracted interest in developing performance-based circular models. This is because most of the assets of buildings, such as floors, interior walls, etc., have long-term use phases, high initial costs and significant maintenance costs.

The **concept of the CE for the Construction Industry** mainly has to do with minimising or eliminating waste and pollution and keeping products and materials in use. To achieve this, construction companies should implement CE processes in all the following phases: design, construction/building, use, deconstruction/decomposition, and recycling.

The Construction Industry is one of the largest consumers of energy and raw materials in the world. In Europe, construction makes up more than a third of total energy consumption. Our homes, buildings, and roads need huge amounts of water, materials, electricity and so more to be built when they reach the end of their lives. The construction Industry uses highly recyclable waste materials but only 40% of construction waste is recycled or reused.

The adoption of business models of CE will contribute to sustainable supply, maintain the productivity of materials during their life cycle and reduce losses of non-renewable materials.

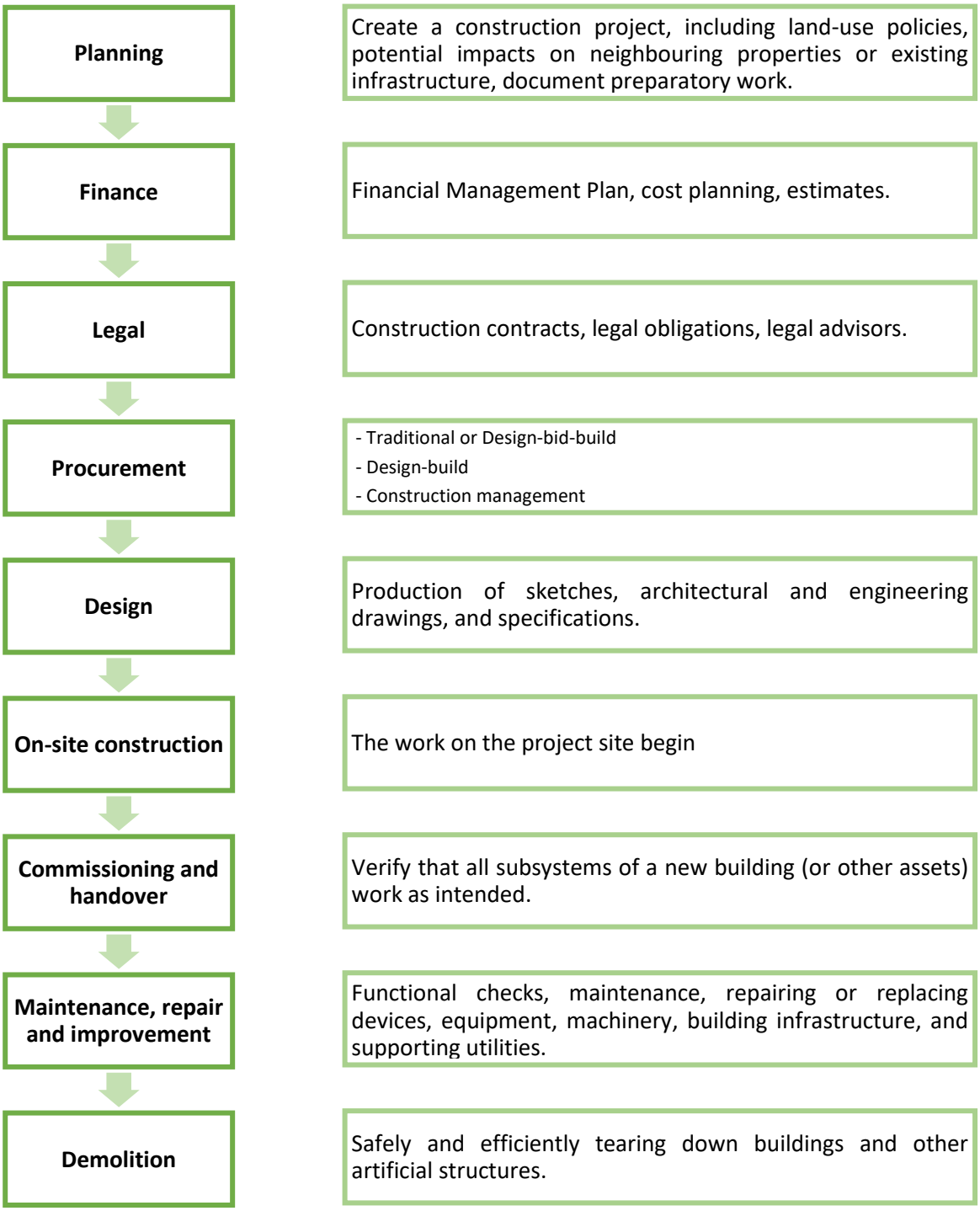

Figure 1. Construction Processes (Source: https://en.wikipedia.org/wiki/construction)

5.3.1 Business Model 1. Circular supplies

Construction materials account for half of the raw materials used across Europe, while construction and demolition waste accounts for ⅓ of all waste across Europe. This business model focuses on the development of new materials to enhance renewable energy, bio-based and fully recyclable materials. New processes are being developed

to increase the reusability and recyclability of construction and industrial products, by-products, and waste streams.

What construction companies could do are the following:

- Keep existing materials in use and maintain their value, thus avoiding waste.
- Use less resource-intensive materials, like bio-based building blocks or low carbon concrete.
- Reduce the carbon of construction materials.
- Have smaller raw material demand.
- Sell a product on the basis that it will be purchased back after some time (resell).

Steel, Aluminium, Iron, and Copper are the most recycled materials in the world, with glass, concrete, gypsum and flooring following.

5.3.2 Business Model 2. Resource recovery

In this CBM existing products are transformed into new ones. These models rely on material reuse and recycling which is more cost and time effective than extracting raw material.

What construction companies could do are the following:

- Facilitate monitoring of materials, components, and parts of a system so that they can be placed on the market and traded in secondary markets of raw materials.
- Extend the life of buildings (products) and building components, components and systems through engineering solutions, such as easy disassembly and reassembly, repair, maintenance and/or upgrade.

For example, glass is the only material that is recycled in Cyprus by the company *Green Dot*, where after processing the glass, it is used as a building material.

Also, *Second Change* is an American non-profit organisation that deconstructs buildings and then salvages the useful materials. These materials are then sold within a certain radius of the retail space.

5.3.3 Business Model 3. Product Life extension

In this CMB, products, systems, and entire structures are designed to last longer with a higher residual value, hence, improving their service life. However, there are technological, market and operational risks, which include a lack of data for the product performance, the customers wanting the newest model within a short period,

therefore products being designed with short lifespans and the increased need for raw materials.

Moreover, this CBM creates textiles that will be loved and kept by their owners through, for example, personalisation options, such as tailoring, including name tags or customer-led designs, all of which increase a user's emotional attachment to items, stimulating longer product lifetimes and repair, rather than disposal (Mugge et al., 2005).

The construction sector has been identified as one of the three sectors with high potential for realising economic and environmental benefits from extending the life of products and materials. For construction, resources recovered at the end of life (components or materials) need to be reintegrated into the value chain. The aim is to prolong the life of the buildings by designing them to last for a longer period.

A good practice example is GIATEC, which makes wireless sensors that attach to the reinforcing steel and monitor the temperature and strength of the concrete in real-time. All information is sent via the SmartRock Plus application.

5.3.4 Business Model 4. Sharing Platforms

This CBM promotes the sharing or exchanging of available resources, machines and/or products. Two good practice examples of sharing are the following.

Werflink is an online sharing platform on which construction sites and companies can share equipment, materials, resources, freight space and facilities. Construction companies in Belgium can swap, sell and share unused construction equipment, materials, resources and freight- and storage space through the platform.

FLOOW2 is a business-to-business sharing marketplace where businesses and organizations can share equipment, personnel, facilities, services, and waste.

5.3.5 Business Model 5. Product as a service

In this CBM, construction companies guarantee performance and deliver a service, not a product. While the Construction Sector cannot be categorised as a service sector, some sub-segments of the construction industry are indeed service-based operations. In the construction industry, this model is suitable only for high-tech products such as lighting, lifts, photocopiers and climate control systems. This means that the company guarantee performance at a period fee and they no longer deliver a product.

5.3.6 Circular Business Processes in Construction