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CIRCULAR ECONOMY AND REAL ESTATE: ALTERNATIVES FOR OPERATIONAL LEASE

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Abstract: The concept that suppliers retain ownership of building products and the materials encapsulated within these products and that their customers 'only' pay for services is a paradigm in Circular Economy. However in many legal systems, elements incorporated in a building such as the facade or the roof, or equipment in a plant, are seen as fixtures and therefore considered to be a part of real estate. Therefore ensuring multi-cyclic behaviour within the so-called technical loop of CE is not evident. At the moment the challenges of property law concerning CE, real estate and operational lease are hardly discussed within the literature. This paper explores the concept of service providing related to operational lease for real estate, with a focus on Dutch property law, illustrated by legal case studies. The paper ends with some conclusions that offer first guidelines for alternative implementations of the operational lease concept, taking into account the CE ambitions to reduce the extraction of the amount of raw materials.

Keywords: Real estate, circular business models, operational lease, property law, service providing.

1. INTRODUCTION

In recent years, circular economy (CE), although in essence given its constituent concepts not a new idea, gained an enormous worldwide popularity as the new sustainability paradigm. This popularity of the idea of a transition from a linear to a circular economy might be explained by the accent on the economic rationale behind CE thinking. The basic elements are price increase on raw materials, combined with Stahels' (1982, 2006) concept of service providing, together assumed to ensure materials' multi-cycling behaviour (Mohammadi, Prins & Slob, 2015).

The concept that suppliers retain the ownership of building products or material, and provide the use under operational lease, is more or less advocated as a CE paradigm (EMF, 2013). However in many legal systems elements incorporated in the building, such as the facade or the roof, or equipment in a plant, will be considered to be fixtures and therefore by the rule of *accessio* owned by the land owner. Therefore ensuring multi-cyclic behaviour within the so-called technical loop might not be evident. In current construction industry literature these legal aspects and their implications in relation to CE have not been taken into consideration yet. In order to bridge this literature gap, this paper explores the concept of service providing related to operational lease for real estate, with a focus on Dutch property law, and will be illustrated by legal case studies.

The paper ends with conclusions that offer first guidelines for alternative implementations of the operational lease concept, taking into account the CE ambitions for reducing the extracting of the amount of raw materials.

2. CIRCULAR ECONOMY

2.1 The need for sustainability

In the 1970's, mainly under the influence of the reports and models of the Club of Rome published under the alarming title 'Limits to Growth' (Meadows et al., 1972) and the 1973 oil crisis, the topic of the finite available natural resources came high on the sustainability agenda. As a result, a movement started that advocated the use of less and cleaner materials, and reduced energy consumption. More recently, the idea that in sustainable production products are recycled has become particularly known for the book by Braungart and McDonough (2002) "remaking the way we make things". One may observe that even earlier authors like Stahel (1983) and Kristinsson et al (2001) followed this line of reasoning, nowadays known as the Cradle to Cradle (C2C) approach.

2.2 The concept of Circular Economy

Although the term has been used earlier, circular economy (CE) has been given a new boost by the reinterpretation in the so-called 'Butterfly Model' (figure 1) of the Ellen MacArthur Foundation (2013).

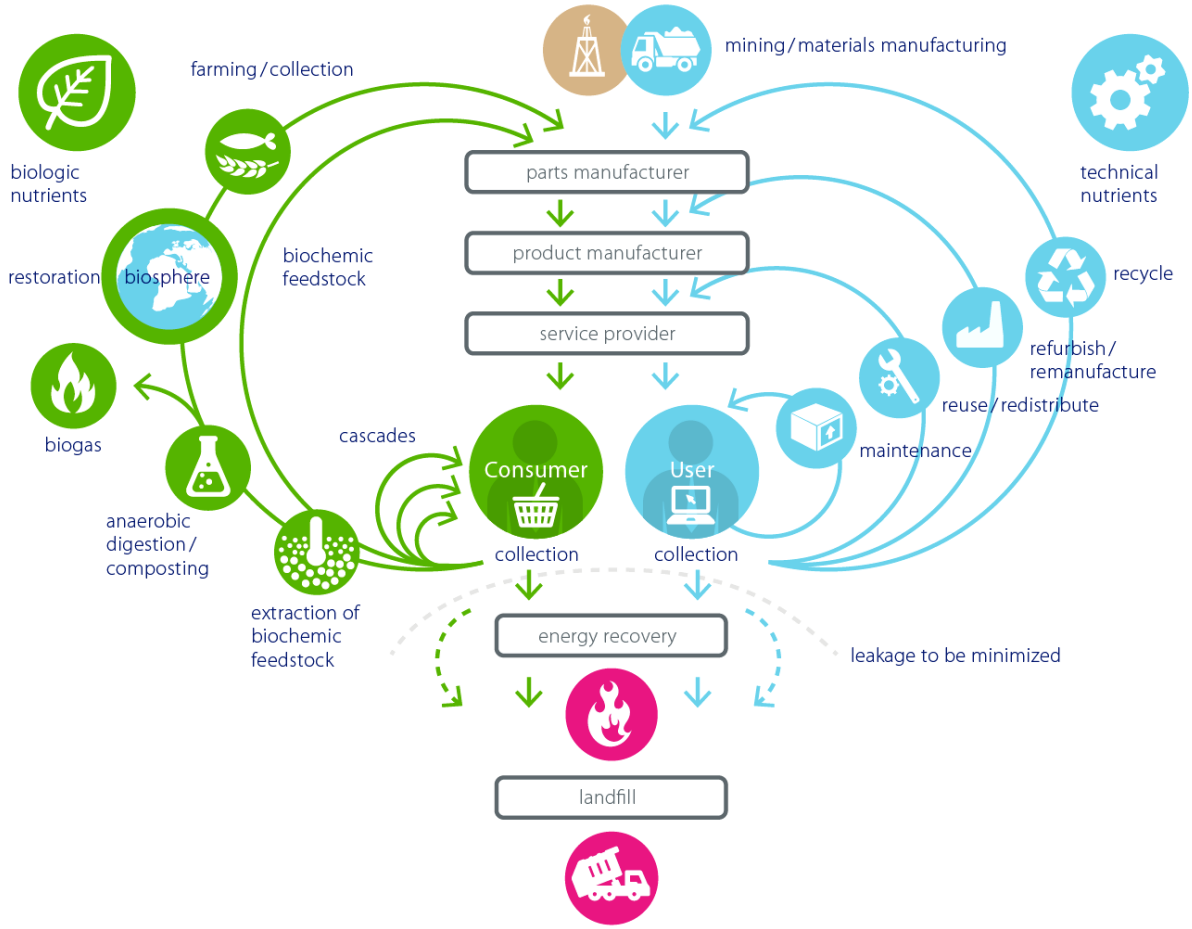

Figure 1: model of CE (EMF 2013)

The Ellen MacArthur Foundation (2013) describes CE as:

> "an economic and industrial system that is restorative and regenerative by design, and which aims to keep products, components and materials at their highest utility and value at all times, distinguishing between technical and biological cycles."

An axiom within CE thinking is that use is made of renewable energy, such as sunlight, wind, waves and geothermal heat, as well as that this energy is available to a sufficient extent, and in that one respects general principles of sustainability like: no pollution, non-toxic, no child labor, etc. Another axiom is that prices of raw materials will increase, this due to the growth of the global population and the increase of wealth. The re-use of raw materials is therefore economically the most obvious solution. Essentially CE is based on the premise that we no longer produce waste and therefore only commodities are used that are regenerative within biological loops or will continuously 'ride' the so called technical loops. The biological loop relates to all those materials that can be considered to be regenerative within the ecological system. All other materials and products (commodities) are expected to continue to circulate (multi-cyclic behavior) in technical loops (Mohammadi et al., 2015).

2.3 C2C compared to CE

From a C2C perspective CE is often considered with a focus on re-cycling. However, any form of multi-cyclical resource conservation (secured by contracts or by the applied business model) meets CE standards, or will be preferable from the aim to avoid embodied (e.g. labor and energy) capital destruction. This solution could involve a product that can be reused as a whole, or a product of which all components can be reused, or recycled at materials level. In terms of CE a preferred solution does not exist; market parties will elaborate this for each specific case.

We conclude that within CE not as much the possibility of reuse or recycling is decisive, but the business models of market players will make multi-cyclical behavior evident, thus being sustainable. More simply stated, raw material conservation leads to economic advantage (Prins, 2017).

2.4 Use instead of ownership

The economic perspective of CE is mainly defined in the concept of 'service providing' (EMF, 2013). This means that producers retain ownership rights of the materials in the products and that customers 'only' pay for services. This is supposed to benefit all involved and even the economy as a whole (EMF, 2013; Bastein et al., 2013). Therefore a major shift from the traditional, linear economic model is the functional use of a product is of importance and not the possession (ownership) of it (Ministry of Infrastructure and the Environment, 2015). The latter means in essence that the supplier keeps the ownership and clients pay for the services provided including use, monitoring and maintenance. Pay per use and operational lease are the most used examples of service providing. These types of disruptive thinking are already embraced by major firms like Philips,[1] Mitsubishi Elevators,[2] Alstom,[3] Rolls Royce,[4] Desso,[5] Interface,[6] Desko[7] and others. Preserving the product in the form of multi-cyclical

[1] http://www.lighting.philips.com/main/company/about/sustainability/sustainable-lighting/circular-economy
[2] http://www.mitsubishi-liften.nl/m-use/
[3] http://www.alstom.com/innotrans2016/renew/
[4] http://www.eco-business.com/news/why-the-circular-economy-is-big-business/
[5] https://www.ellenmacarthurfoundation.org/case-studies/cradle-to-cradle-design-of-carpets
[6] http://www.interface.com/EU/en-GB/about/index/Mission-Zero-en_GB
[7] http://www.circle-economy.com/the-desko-case-diving-into-its-circular-best-practice

behavior is in fact directly beneficial for the producer due to the axiom behind CE of increasing resource prices (see 2.2). While consumers pay no more for expensive short supply of the product and the expensive, scarce materials it contains, but only for the purchase of the services required.

3. CHALLENGES FOR CIRCULAR ECONOMY IN BUILDING INDUSTRY

The wider use of CE inside the building industry is not unproblematic (Prins, 2017). Many parts of buildings and buildings as a whole, are in fact characterized by:

a. A relatively high initial investment, associated with a relatively long service life, so operational lease will result in a fast growing asset part at the balance sheet of suppliers and thus strongly and negatively affecting their solvability and liquidity (it has to be remarked the lessee has the advantage of a reverse situation maintaining his liquidity).

b. Being entirely or in part project-specific (custom-made one-off's), and belonging to a complex entity with different life spans of the constituting parts, so resulting in difficulties concerning as well demounting as all forms of re-using. Also often a high number of service providers is involved.

c. Irreversible technical degradation, limiting the possibilities for re-use.

d. Subject to regulatory requirements such as constructive safety rules and real estate law; limiting re-using building parts as well as possibilities for service providing (substitution risk).

As described in short all these points from a CE perspective are specific challenges. This paper will elaborate upon the challenges posed by a very specific part of real estate law: the ownership of products and materials used in the buildings, related to the concept of operational lease. In the next section we will discuss the implication of the traditional ownership model, especially from the perspective of Dutch property law, being a species of the civil law system as applicable on the European continent.

4. TRADITIONAL OWNERSHIP MODEL OF REAL ESTATE

Financial and legal aspects of a circular economic model for construction are closely connected. Project financing has traditionally been collateralized by the real estate object itself, while the value of such an object can only be accurately estimated if all of its functional components remain part of it. To provide an example: the facade, when removed from its building object, will lose its functional value, while a building without a facade is incomplete and cannot be used. Therefore, it can no longer be valuated as a finished and fully functional real estate property.

According to Book 5, Article 1 of the Dutch Civil Code (legal) ownership is “the most comprehensive property right that a person, the ‘owner’, can have in a thing”. Also, the owner of a thing is the owner of all its components (fixtures), as far as the law does not provide otherwise. The latter means that the law can allow for exceptions on this rule.

In this respect three concepts are relevant:

a. Dutch property law makes a distinction between *movables* and *immovables* (Book 3, Article 3 Dutch Civil Code). Decisive is the question if an object is destined to remain on its

location permanently, regardless of whether it is technically possible to move it to another site. Also the subjective intention of the builder is irrelevant (Van Vliet, 2002). This was laid down by the Dutch supreme court in *Ontvanger/Rabobank Terneuzen-Axel* (Hoge Raad 31 october 1997, NJ 1998/97) ruled that a 'Portacabin' (prefabricated, container-like portable unit), was immovable ("real property") because the unit was seamlessly attached to the land and an existing building and connected to the infrastructure grid for water, gas and electricity.

b. Accession is a term that means that the owner of the land is the legal owner of all immovables built in or on it (Book 3, Article 4 and Book 5, Article 20 Dutch Civil Code). *The rule of accession*, as applied to real estate can be traced back to the maxim *superficies solo cedit* in Roman law, and this principle applies in legal systems based on Roman law, such as Dutch property law (Van Vliet, 2002). In short the ownership of everything that is built on or in land, follows the ownership of the land. As explained in e.g. the Roman *Institutes of Gaius* (2.73) this rule has two aspects. If Alex builds a house on his land using bricks and wood of Barbara, Alex, as being the owner of the land, by law becomes the owner of the house, regardless of the fact that the materials used to belong to Barbara. On the other hand, when Alex builds a house using his own materials on the land of Barbara, she becomes the owner of the house, despite the fact that the materials belonged to Alex. The result in both cases is that original owner of the materials cannot reclaim his/her ownership (Van der Walt & Sono, 2016).

Not only the (immovable) building is considered to be part of the land (Book 5, Article 20 Dutch Civil Code), but also fixtures are considered to be part of the building (Book 3, Article 4 Dutch Civil Code). The question if an object becomes a fixture of a building, will be decided according to Dutch civil law by two criteria:

1. First that the component cannot be physically removed without causing considerable damage to the main object or the attached component.
2. Secondly also without such an attachment a component can become a fixture. This as '*accessio'* will also take place if the component is a fixture according to general opinion. The Dutch Supreme court (*Depex/Bergel* Hoge Raad 15 november 1991, NJ 1993/316) provided two factors that are important for the latter test: a) the main object will considered to be functionally incomplete without the component or, b) the component is specially adapted to the main component. E.g. a curtain-wall facade would be covered by the second point, even if most current envelope systems are already engineered in such a way that they would not fall into the first point. Important to note is that the intentions of the parties involved are excluded from the legal consideration, as being subjective.

c. *Mortgage law* according to Book 3, Article 277 section 2 Dutch Civil Code (in addition to book 5 of the Dutch Civil Code), protects the right of the mortgagee (the funder) to hold as *security* everything which is part of a property (such as the building on the land, or the fixtures of the building). In the case of an interest payment or repayment default of the debtor, the bank is entitled to sell the mortgaged property in public by auction and to recover the secured debt-claim from the sale proceeds.

To sum up: everything which is fixed property on a piece of land owned by a specific party, by definition is part of the "real property" of that owner. The rule of *accessio* means that a supplier can't claim ownership over, for example, a door. This because the door is a fixture of the house and therefore part of the property. Only in specific cases, as provided for by the law, Dtuch property law allows exceptions to the rule of *accessio*. We will discuss this under section 5.

5. HOW TO SPLIT THE OWNERSHIP OF A BUILDING AND ITS CONSTITUENT PARTS

5.1 Motives for *accessio*

There are two motives for the rule of *accessio* (Van Vliet, 2002; Mes et al., 2016):

I. Legal security: for third parties legal ownership of objects would be hard to determine if it was based on parts.

II. Preservation of value: this presupposes that the sum of the parts together is worth more than all parts taken separately. Once different objects have been joined, the law should prevent the loss of the added value of the unity.

In other words: the purpose of property law is to offer legal security and to maximize and preserve real estate values in society.

The first motive could move in a different direction in the near future through the use of Building Information Modeling (BIM) and more standardized interfaces. This would mark components according to supplier (and eventually owner) through an ongoing BIM documentation of building components.[8] Also, or even more, the introduction of 'blockchain technologies' introducing radical different financing and ownership models of complex products and services might enhance this shift (Prins, 2017).

The second motive (preservation of value), seems fully valid under the principles of the traditional, linear economy. If a component of the building were to be removed, for example the stairs or the facade, the building would become unusable, leading to loss of economic value. On the other hand, after the removal also the component itself could be subject to a loss of value, because the component gets damaged or the component is specially adapted to the building. As worked out above under CE principles however it's just the fact that suppliers retain ownership rights (and therefore the right to remove and re-use the component and its materials) hence aiming for, if not preserving, value retention. Therefore, one may argue that CE practices based on the concept of service providing in terms of operational lease urges a radical change from the traditional ownership model on which property law has been based since Roman times (Mes et al., 2016). However, changes in fundamental rules of property law are not easy and can hardly be expected in the coming decades. Therefore we will concentrate on solutions based on the law as it stands now.

5.2 Case based exceptions to the rule of *accessio* concerning real estate

However, in specific cases Dutch property law allows for exceptions on the rule of *accessio*. That means, even when a component is considered to be a fixture of land, ownership of land and fixture can be separated.

The main exception is the establishment of a building lease (opstalrecht). This is a limited property right (a right in rem), which enables the lessee to have the ownership of buildings or constructions or plants (vegetation) in, on or above an immovable thing owned by someone else. Therefore, the building lease would allow for keeping ownership on the side of the manufacturer or a third party such as a service provider. However, the Civil Code puts some limits: the object of such an ownership, separated from the land, must be a building or a 'construction'. The exact meaning of the latter is not completely clear. But from literature and

[8] See also the recent 'Madaster' initivative: https://madaster.com/

case law it can be concluded that in Dutch property law, only a component which has sufficient (economic) independence can be separated from the land or a building (Bartels & Van Velten, 2017). Common examples are radio towers, wind turbines, or utility pipelines. Also building leases are established for elevators and technical equipment in buildings. For this legal separation by use of a building lease, the value of the building has to be balanced against the value of the individual components of the building. Moreover, components can only be separated which do not downgrade the unity (this follows the general rule of accession concerning the 'unity and the subsequent' as also laid down in Book 5, Article 14 of the Dutch Civil Code, concerning 'moveable property'). The value of the unity, however, is again based on the public opinion.

To the best knowledge of the authors in Dutch real estate only one case of split ownership based on service delivery has been implemented in the Netherlands. Under the name of 'M-use' Mitsubishi Elevators Europe offers the possibility to the owner of a building to lease the elevator. At the moment a similar approach is under research for facades of buildings (Azcárate-Aguerre et al., 2017). But it appeared to be that highly specific contracts need to be laid out. These contracts must guarantee that the value of the property is safeguarded in case any of the collaborating parties needs to terminate or modify its involvement during the many years of the project's service-life. We will elaborate further on this in section 6.

Based on the case of Mitsubishi elevators, bankruptcy on either end of the service contract can be dealt with through traditional means: If the supplier files for bankruptcy, value is held not only by the physical asset (in this case the elevator), but also by the ongoing performance contract in which the asset is included. It is expected that the rights from the contract can be purchased and then be operated by another service provider (Azcárate-Aguerre et al., 2017). However, we must add that at this moment it is not clear if there will be a market for this kind of service contracts.

In the event of a client bankruptcy the nature of the asset limits the capacity of the service provider to simply claim it back without resulting in significant losses due to removal and reprocessing costs. In such a case the service contract could stipulate, for example, that the next owner of the building (if it is to be sold to repay the client's debt) must continue the service contract, or purchase the asset from the service provider in a traditional, linear procurement process. However, at the moment, mainly because of lack of case-law, there is uncertainty if this will work in practice.

Another approach can be found in the 1979 case of the Dutch Supreme Court, which would offer perspectives for a leasing scheme based on third-party legal ownership. In such cases an essential part of the construction would not be considered to be a component of it, in case a general opinion can be derived from the lease contracts. An example is the navigation system for ships in the *Radio Holland* case, Hoge Raad (Supreme Court) 16 March 1979, NJ 1980/600. In this case the question had to be answered if an electronic navigation system fitted in a ship was a fixture because it was crucial for operating the ship. At that time such a system was only fabricated by a single supplier (Radio Holland), who held the de-facto market monopoly over this specific system, and who only distributed it under a leasing scheme. In this case the Dutch Supreme Court ruled that the fact that normally necessary equipment is *only* leased, and not transferred in ownership, might indicate that this equipment is not a fixture according to common opinion. In other words: the common opinion can be influenced by contractual standards.

It must be noted that in this specific case the market power of the supplier was enough to allow him, as a third party, to retain ownership of all such systems installed on clients'

vessels. Such a case of concentrated supplier power is, however, difficult to imagine in the construction industry. On the other hand, this case law demonstrates that although if under Dutch property law a thing might be functionally incomplete without a certain component, this does not lead automatically to the conclusion that the component is legally a fixture.

6. ALTERNATIVE APPROACHES CONCERNING CE AND OPERATIONAL LEASE

6.1 Accessio and Operational Lease

As stated, according to Book 5, Article 1 of the Dutch Civil Code (legal) ownership is "the most comprehensive property right that a person, the 'owner', can have in a thing". Also, based on the rule of *accessio* the owner of a thing is the owner of all its components (fixtures), as far as the law does not provide otherwise.

Except the M-use case, as discussed in section 5.2, and a Climate-KiC funded small scale pilot on four façade elements applied on a large university building of TUD (Azcárate-Aguerre et al., 2017), as far as known to the authors no real life cases exist in which operational lease in a CE context is applied for fixtures within the building industry.

The M-use example, seems to provide some, but rather complex, perspectives to implement CE in the building industry based on the concept of service providing. by establishment of a building lease for building components. Based on the Radio Holland case (section 5.3)., it would be theoretically be possible to influence the the answer if a component is a fixture, by use of leasing contracts. However it might take long – and it is not really probable at the moment – within the construction industry before suppliers can establish a market monopoly leading for certain components not to be considered fixtures according to common opinion . Further, more specific contractual arrangements need to be established considering bankruptcy of either the client or the supplier. Considering collateral risk, operational lease therefore seems only possible for clients with a very high non-disputable credibility or otherwise in contracts in which revenue streams for funders one way or another are reduced in risk (Hieminga, 2015).

Therefore, from a legal point of view, our conclusion is that this leaves uncertainties and therefore does not offer a solid basis for development of a circular business model.

6.2 Economic ownership

Another approach might be the concept of 'economic ownership'. This is not a notion in the Dutch Civil Code, but particularly relevant in fiscal law.

Economic ownership describes the situation where someone obtains the full enjoyment of the object, including bearing financial risk for it, while not being its legal owner. As mentioned above, economic ownership is a concept that has no fixed legal meaning in property law, but depends on the basis of the right of the user. Long-term leasing of real estate such as land or built objects on it is an example of such a situation; but economic ownership can also be based on a contract (e.g. a contract of sale). However, the success of the specific legal relationship depends on whether the economic owner can invoke his rights against third parties, such as a new legal owner of the property, or the mortgagee.

The right of removal is a right, which the economic owner can invoke against third parties. If the economic owner has the right to remove components which he placed in a construction or building, an economic separation will be composed between the construction or building and the applied object. The right of removal is therefore a way to avoid an unjust enrichment-action. Because of the right of removal applied objects can be removed at all times from the construction or building where it is placed in. If the right of removal would not exist, these objects would be applied by operation of law and thus would be entitled to the ground owner. However the right of removal is legally limited to cases where the economic owner is also the user of the building (and land) itself, e.g. the holder of a ground lease or the tenant in case of renting (a part of) a building (Abas, 2007; Bartels & Van Velten 2017). Also therefore, the wider use of the concept of economic ownership to further promote the transition to CE by using operational lease within the building industry seems not to be so self evident.

6.3 Lease and pay per use of non – fixtures

It has to be noted that in the literature on implementing CE within the construction industry, series of examples exist of which those most often described for the Dutch market are already listed within section 2.4. The most well-known example might be Philips with its pay per lumen concept as first applied at the office of the Turntoo company. Others concern furniture (Ahrend, Desko), and carpet tiles (Interface and Desso). However, all these cases are from a property law perspective uncomplicated, because they concern non–fixtures. In other words, the rule of accessio does not apply.

Other examples often listed are from outside the building industry such as Alstom (trains) and Rolls Royce (aircraft engines). It has to be remarked these two latter examples are primarily based on specific business models which don't originate specifically out of CE thinking.

6.4 Recycling waste, Take Back and Buy Back as construction industry specific CE solutions

Recently the Dutch government claims that up to 90% construction waste will be recycled (Ministry of Infrastructure and the Environment, 2015). This estimation largely is based on the measurement methodology (kg's of waste) as well as the wide spread use of concrete waste as granulate for roadbuilding. To a lesser extend this is due to more recent innovations of the concrete industry to re-use concrete granulate for making new concrete elements and new bricks.

From a C2C perspective concerning the contribution of concrete this percentage is often discussed in terms of functional degradation and loss of embodied energy. From a CE perspective however, departing from the axioms as given in section 2, the re-use of concrete as granulate is compliant with the intended continuing multi-cycling behavior of materials. It's primarily the loss of Portland cement (of which larger percentages of what is used have to be re-mined for producing new concrete) and the loss of embedded value in terms of labor cost and energy (the latter as long as it is not clean nor cheap) which counts against this solution, making the CE business case behind less feasible (Prins, 2017).
Besides concrete this high recycling percentage mentioned above also is due to Dutch and partly EU based sometimes already rather dated waste regulations, sometimes also on since long existing more commercials models concerning for instance the treatment of plastics, metals, electronic waste and so on (Tukker et.al., 2016). The gypsum industry is another

example, which although regulated now in the Netherlands, already organized itself assembling gypsum waste to make new gypsum with a 99% purity which is highly CE compliant. Rockwool assembling insulation waste and up-cycling it to Rockpanel is an example of a firm having set a rather optimal if not ideal CE standard, even before it was set.

At a component level more and more start-ups are entering the market often specialized to certain segments and working with internet based market platform's. Sometimes (for instance inner wall Metal-stud profiles) not that well known to larger groups of customers, sometimes (for instance second-hand wood planking and beams) even known to the wider public. A rather innovative concept is a Dutch startup acting as a broker in between demolishers on the one hand and architects and their clients on the other, this for all thinkable building components, trying to stimulate designers and their clients to think more CE wise, by considering buildings to be demolished as a stock of to be re-used materials and components. Recently also several –larger- Dutch municipalities are trying to explore this concept, also known as 'urban mining' on a regional level (Voet & Huele, 2016).

Examples of CE implemented to building projects as a whole are scarcer and a lot of attempts end up claiming being 'circular' as often closer reading of the 'promotional materials' resolves this circularity being limited to C2C.

This on the one hand has to do with the problem of procuring buildings although aiming to be CE based on split-ownership, in practice dealing foremost with just a main contractor as the tenderer. Often clients looking for CE solutions just ask tenderers for a vision on CE as precedents on alternatives still are lacking, as often is the knowledge of clients, as well as the industry, on how exactly to define a CE building. The state of the art in research attempts to define CE building passports (and related CE assessment methodologies) might be illustrative for this (Debacker & Manshoven, 2016). Reasonably one would expect the real property rules also are put forward within this context, but to the authors best knowledge up till now this is not the case.

Buy back contracts have got several forms varying from an obligation to buy back larger parts of a building at the end of the contract period by the different suppliers, in case the client likes to do as such (depending on assumed possible competing alternative offers) at that very moment, to an agreed residual value for taking back the building as a whole whether or not being translated into a shortage on the cost at the initial delivery of the building.

A remarkable example is the recently delivered building for the District Court of Amsterdam which has a contract period of five years after which the building had to be removed.[9] The architecture firm, an SME (Small and Medium Enterprise) delivering also engineering and contracting services, who won the tender, designed a rather traditional building which however can be easily de-mounted and re-mounted at another site. The residual value of the materials was translated into a reduction of the clients' investment. This example clearly shows that shortening the life span, as long as multi cyclic behavior is modelled, from a CE perspective doesn't necessarily reduce sustainability (Prins, 2017).

[9] https://www.cepezed.nl/projects/170-tijdelijke-rechtbank-amsterdam

All well-known examples, which are extensively reported on (see section 6.3) within this context, concern non-fixtures (movable objects in buildings) or are not concerning real property.

7. CONCLUSIONS

In this paper we explored the challenges offered by of Dutch property law concerning CE, real estate and operational lease. As shortly addressed in section 3, only suppliers with high equity will be able to cope with the – financial – issue of balance stretch (growing amount of long term fixed assets) and for those delivering the more capital extensive parts of the building, the model might be questioned anyhow beyond the level of a few business cases (Prins, 2017).

Operational lease might be possible for rather specific – discrete – components, of which the functioning is heavily reliant on the service providing. Considering collateral risk, operational lease seems only possible for clients with a very high non-disputable credibility or otherwise in contracts in which revenue streams for funders one way or another are reduced in risk. Also economic ownership does not seem to be providing real opportunities to wider introduce the concept of CE service providing in the building industry at the moment.

On a larger scale of the building as a whole, buy back types of CE models have already appeared to be possible in the benefit of both suppliers and clients without being hindered by property law in case one tries to implement operational lease. However, in these cases real multi cyclic behaviour of materials behind a –reasonably to be expected – single loop is not guaranteed within the business cases. Section 6.4 illustrates that parts of the construction industry applying specific production procedures (Rockwool) or making sector wise innovations (gypsum sector, and concrete sector) are able to cope with the CE concept by applying all sorts of take back procedures mostly based on existing waste recycling models.

At the level of building components new start-ups are entering the market trying to implement CE thinking, of which a brokerage between demolishers and architects seems the most innovative at the moment.

It might be stated that the economic rationale for multi cycling behaviour of materials in case of operational lease might be economically seen more evident as in case of e.g. buy-back, but in fact there are also no formal guarantees built into this concept. As CE is assuming materials riding the loops based on economic evidence, one can question to what extent market parties, besides having a reasonable CE business model, have to be forced to act in their own benefit. Creating a CE as a societal regulated ‘planned economy’ seems an ideology, which is less favourable as the movement is most often considered to be nowadays. This even more in case operational lease would be treated as the one and only solution, resulting in a society with industrial have all’s and consumers as the have not’s.

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