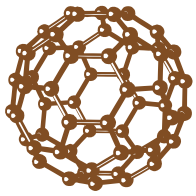

RECAP

REAL ESTATE CARBON ACCOUNTING

Version 1.10

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Contents

List of Abbreviations

GAAP	Generally Accepted Accounting Principles
IAS	International Accounting Standards
IFRS	International Financial Reporting Standards
P&L	Profit and Loss

Foreword.

Carbon accounting has so far focused on carbon flows over a given period, and as a result of the approach corporations have been essentially focusing on operational emissions (i.e., carbon emission during the production of a product or service), with little follow-up of what happens to that carbon after the production.

This approach to climate change “accounting” does not seem fully aligned with the nature of the physical problem which is aimed at keeping the concentration of greenhouse gas concentration in the atmosphere below a given level, irrespective of when the flow takes place.

According to the IPCC global Net zero carbon dioxide (CO2) emissions are achieved when anthropogenic CO2 emissions are balanced globally by anthropogenic CO2 removals over a specified period. Translating into accounting words, this is more akin to balancing assets and liabilities, rather than netting off revenues and costs.

Flow management (like P&L) is a tool to manage the short-term perspective and immediate impact of one’s business decisions. The long-term prospect of a company, its health is reflected in its balance sheet.

One of the key difficulties that carbon management is facing today, is that while carbon might have a price, it seldomly has a value. Carbon is not a primary good that is valuable to any material production process. The introduction of a balance sheet into a carbon accounting framework has the main advantage of shifting this paradigm as it allows to externalize a value of the carbon as a part of the asset which is being produced.

1. Introduction

Since carbon emissions are currently not specifically priced, it does not yet represent part of the acquisition cost of assets. As such, it is currently not accounted for under e.g., International Financial Reporting Standards (IFRS), US or local generally accepted accounting principles (GAAP).

The purpose of this document is to describe accounting policies and procedures for carbon accounting. It provides an initial framework to monitor the resource consumption. While it has been structured and designed with real estate in mind, it could be extended to any other asset/product.

It represents a carbon "accounting" logic, although in this case accounting does not mean a presentation of transactions according to national or international accounting standards. The following policies and procedures have been developed for the sake of efficient and economic management of the operational and embedded carbon.

It is neither practical nor achievable to anticipate all potential cases upfront or to provide guidelines that deliver completely prefabricated answers. As such the framework focuses on a rule-based approach presented in this manual, which allows to address situations that may arise in the normal course of business. Nonetheless, it should be noted at this point, that the focus of the manual is on exemplary clarification of the accounting for carbon. Several terms and definitions used in this manual are similar to the wording of established International Financial Reporting Standard (IFRS) terms, as e.g. the terms asset and liability. However, it should be noted that the items described here do not fulfill the definition of the IFRS standards or its framework, and therefore should not be interpreted in a similar fashion then within the framework of IFRS, or any other GAAP item.

2. Scoping and Definitions

2.1. Scoping

The manual is intended to provide a guideline for companies that cause carbon emissions. The main objectives of this accounting manual are:

- To establish an "accounting" model that reflects the actual cost of consumption of operational and value of embedded carbon by a reporting entity.
- The preparation of a carbon balance sheet to serve both disclosure as part of external reporting and as the basis for internal management of emissions; and
- Assist stakeholders and management in understanding and interpreting the carbon emission and related cost and benefits when making decisions about investments in either maintenance of existing assets and/or producing new ones.
- To provide a framework that allows to illustrate the cost and value associated with carbon management at the corporate level.

While this framework has been conceived with the view of construction and management of real estate in mind, it could be conceptually adapted for other industries.

2.2. Definitions

Asset	Is an asset as defined in the GAAP used by the reporting entity.
Carbon Asset Fair Value	The fair value of a carbon asset does not consider the amount of carbon that has been used to produce the asset (as this carbon has already been emitted) but it considers the amount of carbon that would need to be emitted to produce an asset which would fulfill similar economic activities given the current state of technology. As such the fair value of embedded carbon asset is deemed to reduce as the world economy moves from a carbon-based economy to a decarbonized economy.
Carbon Asset production	A carbon asset is produced when the carbon emitted by the company results into the production of an asset that is able to generate additional future economic benefits to the company. This is for example the case when real estate is built, or when

	new square meters are added to an existing building, or when a façade is being renewed.
Carbon equity	It is to be noted that the so-called carbon equity does not fulfill the definition of equity under IFRS. Under this model it is a measure of the difference between the carbon assets of a company and its carbon liabilities. Carbon equity is the reflection of what would be the liability to the shareholders (in case of negative equity), or the value to the shareholders (in case of positive equity) of the carbon operations at a given reporting date.
Carbon gain/loss	The theoretical financial gain/loss that results from a change in value of a carbon asset or a carbon liability.
Embedded carbon	Embedded carbon is the carbon footprint of all goods, material, assembly, that is emitted during the process of "producing" an asset. This is for example the carbon that will be emitted in the construction of a real estate asset, or in its refurbishment.
Future operational carbon liability	It represents the theoretical cost of future carbon emission that is committed at the time of the production. These emissions will be needed to allow the asset to produce its expected future benefit.
Operational carbon	Emissions of carbon dioxide and other climate-impacting gases during the regular operation of a reporting entity. For a real estate company this is the carbon used in powering, heating, cooling its portfolio, but also the carbon used in its own office activities. Operational carbon does exclude the carbon used to produce an asset (which is considered in the Embedded Carbon)
Green Dividend	Green Dividend results from the vote by the reporting entity´s General Meeting to reduce its ordinary dividend and instead invest the proceeds in carbon mitigation projects that do not meet the company´s financial return hurdles. In the carbon accounts Green Dividend accrues as Equity.

Price of carbon	The market price of carbon as determined for the purpose of this Carbon Accounting based on the trading of carbon on an active market.
Paid-Carbon Emission	A paid-carbon emission is a carbon emission that took place during the reporting period for which the reporting entity can link a direct cost in its GAAP items (for example an amount of carbon for which it had paid-carbon taxes). In GHG carbon accounting the difference between paid-carbon and unpaid-carbon will also sometime be referred to as market based and location based.
Retained earnings	Changes that run through the carbon P&L are reflected in retained earnings at year-end and are as such recognized as "addition" to carbon equity in the balance sheet.
Unpaid-Carbon Emission	Unpaid-Carbon Emissions are carbon emission for which the company cannot link a direct cost in its IFRS or otherwise GAAP accounts. Direct cost can be a carbon tax, a compensation scheme, the cost of Direct Air Capture (DAC), Carbon Capture and Storage (CCS) technology, or a market based clean energy procurement policy.

3. Assumption and estimates

3.1. Definition

Unlike financial accounting where most of the input can be reliably estimated, carbon accounting will rely on a substantial amount of assumption and estimated, as well as key judgment from the reporting entity.

Theses assumption and estimate will be related to input data with respect to paid and unpaid-carbon emission, fair value assumption with respect to available technology, or even carbon price itself.

Unlike financial accounting the intention is here is not to provide with a true and fair view of the financial position of the reporting entity, but to provide a tool that will allow the user to quantify the exposure of a given entity to the carbon economy.

Carbon assets, carbon liabilities, and carbon equity which are defined in theses principle do not meet the standard of GAAP asset, liability, or equity, among other reason, because they are hard to precisely estimate.

3.2. Disclosure

The reporting entity will disclose to the users as much as reasonably practical all the information needed for it to understand where and to what extend assumptions, judgement and estimates have been used by the reporting entity.

This will include at least the following information:

- The value and source of carbon price used for the value of the asset and liability in this report,
- The assumptions made in the fair value of the Embedded Carbon Asset,
- The input from the GAAP accounting used in the Carbon Accounts (if any),
- The assumption made for the lack of reusability of each Embedded Asset.

4. Accounting Treatment – Carbon Balance Sheet

4.1. Embedded Carbon Asset

4.1.1. Initial recognition

Embedded carbon is the carbon footprint of all goods, material, assembly, that is emitted during the process of "producing" an asset. Under the model, carbon is initially recorded as an asset when assets are (i) produced or (ii) acquired from a third party.

An Embedded Carbon asset is recognized in case when:

(a) An asset is recognized under the GAAP used by the reporting entity as a result of a transaction with a third party via a market transaction or otherwise and that transaction does not in itself generate carbon emissions; or

(b) An asset is recognized under the GAAP used by the reporting entity after being produced by the reporting entity, or in a transaction with a third party in a process that generate carbon emissions; or

(c) The remaining useful life of an existing asset under the GAAP used by the reporting entity is increased through a process that generates carbon emission,

In case of (a) the embedded carbon asset shall be recognized through (i) Embedded Carbon Asset at Fair Value

In case of (b) or (c) the embedded carbon asset shall be recognized through (i) an Embedded Carbon Asset as a result of company's activities

4.1.2. Initial Measurement

4.1.2.1. Embedded Carbon at fair value

Embedded carbon that qualifies for recognition as an asset under (a) above should be initially measured at its carbon fair value as measured in accordance with § 5.1

4.1.2.2. Embedded Carbon as a result of company's activities

Embedded carbon that qualifies for recognition as an asset under (b) and (c) above should be initially measured at its theoretical carbon cost, which is the product of the amount of carbon emitted to

produce the asset (ton), times the market price for one ton of carbon at the time of production of the asset (EUR/ton). Each component will be described in more detail below.

$$Embedded\ carbon\ asset\ as\ a\ result\ of\ company's\ activities = c\ \times p$$

Where:

1. $\boldsymbol{c}$ is the amount of carbon emitted to produce the asset.

A certain amount of carbon is emitted in the production of an asset. This amount can either be estimated by the reporting entity either as an aggregate (for example as the average carbon emission for the construction of a sqm of office) or using a specific carbon life cycle analysis for the asset.

2. $\boldsymbol{p}$ is the market price for one ton of carbon at the time of the production of the asset.

If the production of the asset takes place over a given period, the carbon price used shall be equal to the mathematical average of the market prices of carbon over the duration of the reporting period.

4.1.3. Subsequent Measurements

Embedded Carbon asset is always measured at fair value for any subsequent measurement in accordance with § 5.1

4.1.4. Derecognition

An Embedded Carbon asset is derecognized when the corresponding asset is derecognized under the GAAP used by the reporting entity.

4.2. Embedded carbon deduction for lack of reusability

The embedded carbon reduction for lack of reusability represents part of the asset that cannot or will not be recycled at the end of the useful life of the asset, and will end-up being disposed as waste, or equivalent.

For example, in the case of a real estate asset, this would represent the part of the infrastructure and/or the inner fitting of the asset will need to be renewed on a regular basis during the useful life of the asset and will end-up as construction waste by opposition of the superstructure which useful life can be considered as indefinite, as it can be re-used as part of the retrofitting of the asset.

For other assets this could represent the potential recycling efficiency of the carbon intensive material used to produce the asset.

For example, in an electronic product this could be the amount of material that will be lost in a recycling process because it cannot be properly recovered.

4.2.1. Initial recognition

The Embedded Carbon deduction for lack of reusability is recognised at the time of the recognition of the embedded carbon asset to which it relates.

It is booked on the asset side of the carbon balance sheet of the reporting entity, on a specific line item.

A counter booking is recognised on the reporting entity carbon P&L.

4.2.2. Initial Measurement

The initial measurement of the Embedded Carbon deduction for lack of reusability is estimated by the reporting entity either (i) specifically for the asset or (ii) as an average across its balance sheet of all assets of the same kind and quality.

$$Embedded\ Carbon\ deduction\ for\ lack\ of\ reusability = fv(ECA)\ x\ Rf$$

Where:

$fv(ECA)$ is the fair value of the Embedded Carbon Asset under consideration

Rf is the percentage of the asset that cannot or will not be recycled at the end of the useful life of the asset, and will end-up being disposed as waste, or equivalent

Rf is determined by the reporting entity. It can be precisely calculated using a carbon life cycle analysis or approximated. The reporting entity will need to disclose how Rf has been determined in its carbon accounting notes.

4.2.3. Subsequent Measurements

Embedded Carbon deduction for lack of reusability is remeasured at each reporting date using the same methodology then for its initial measurement.

Change in the value of Embedded Carbon deduction for lack of reusability triggers an equivalent counter booking through the Carbon P&L.

4.2.4. Derecognition

An Embedded Carbon deduction for lack of reusability is derecognized if the asset to which it related is derecognized under the GAAP accounts of the reporting entity.

The derecognition of Embedded Carbon deduction for lack of reusability triggers an equivalent counter booking on the Carbon P&L of the reporting entity.

4.3. Unpaid-carbon liability

4.3.1. Initial recognition

The **unpaid-carbon liability** represents the theoretical value of an Unpaid-carbon Emission (either embedded or not) that has been emitted during the production, construction, demolition, or the operation of an asset, as well as during any other activities of the company as a result of its business operations. It thus represents the theoretical liability that a company would have to bear towards society for carbon usage to run its business if carbon had a price (externality).

An unpaid-carbon liability is always recognized when Unpaid-carbon Emission takes place and always represent the counter booking of either (i) an Embedded Carbon Asset (as per § 4.1.1) or (ii) a Carbon Expense in the Carbon Profit and Loss Statement (as per §7.1)

A distinction is made between:

(a) Unpaid-carbon liability used by the company; and
(b) Unpaid-carbon liability acquired by the company.

(a) Unpaid-carbon liability used by the company

Regardless of the reason for the Unpaid-carbon Emission, an unpaid-carbon liability used by the company will be set up at the time of emission. The **Unpaid-carbon liability used by the company**, represent the value of the carbon that has been emitted by the company since the initiation of carbon accounting to produce its assets, or run its daily operations. It has an indefinite life and cannot be transferred to third party.

For example, in case of a real estate business unpaid-carbon liability used by the company arises when a construction or refurbishment work is undergone on a building as well as during the operation of asset, for example as a result of heating, cooling or use of power by its occupants.

(b) Unpaid-carbon liability acquired by the company

An unpaid-carbon liability acquired by the company is recognized when a company acquires an asset that already exists, in a transaction with a third party that does not in itself generate carbon emissions.

4.3.2. Initial Measurement

The initial measurement of the Unpaid-carbon Liability is always equal to the following counter booking:

(a) Unpaid-carbon liability acquired by the company.

In case of Unpaid Emission resulting from the any of the activities described in § 4.1.1 (a) , the initial measurement represents the counter booking to the Embedded Carbon Asset at fair value which is booked in accordance with § 4.1.2.1

(b) Unpaid-carbon Liability used by the company.

In case of Unpaid Emission resulting from the any of the activities described in § 4.1.1 (b) or (c) the initial measurement represents the counter booking to the Embedded Carbon Asset as a result of the company's activities which is booked in accordance with § 4.1.2.2

In case of Unpaid Emission resulting from the operation of the company that does not lead to a carbon asset recognition, the Unpaid-carbon Liability used by the company booked is equal to the related Carbon Profit and Loss expenses in accordance with § 7.1

4.3.3. Subsequent Measurements

An Unpaid-carbon liability is not subsequently remeasured.

4.3.4. Derecognition

An Unpaid-carbon liability acquired by the company is derecognized when the related asset is transferred to a third party. The amount of Unpaid-carbon liability derecognized in this transaction is the counter booking to the derecognition of the Embedded Carbon Asset which is transferred.

An Unpaid-carbon liability used by the company is derecognized when a Green-Dividend is recognized. In that case, the amount of Unpaid-carbon liability used by the company which is derecognize is equant to the amount of Green-Dividend declared.

4.4. Future operational carbon liability

4.4.1. Initial recognition

The **future operational carbon liability** represents a future carbon obligation that the reporting entity is committing to, because of its ownership of the asset. This represents the future emissions that will take place because of the operation of the asset and are necessary for the asset to fulfil its expected functions. The future operational carbon liability represents the theoretical cost of the future carbon emission of the asset as it is delivering its expected economic value.

For example, this represent the amount of carbon that will be emitted by a real estate asset in order to allow to heat it or cool it over its remaining expected useful life.

Under this model, as soon as the reporting recognize an asset on its GAAP balance sheet it needs to reflect a future operational carbon liability. This liability is based on the assumption of

(i) a perpetual use of the asset,

or

(ii) a defined useful life consistent with the GAAP accounting used by the reporting entity. In that case, the value of the emission shall not be discounted, and the underlying assumption for the useful life of the asset needs to be explicitly disclosed.

A Future operational carbon liability is recognized when:

(a) An Embedded Carbon Asset is created in the balance sheet.
And
(b) This asset to which the Embedded Carbon Asset is attached is expected to generate carbon emission to deliver its future economic benefit.

The future operational carbon liability is always recognized on the carbon balance sheet, and balanced by an equivalent counter booking in the entity's carbon P&L.

The immediate booking of the loss in the reporting entity carbon P&L reflects the commitment made by the entity at the time when the asset is recognized to spend the carbon. While the actual spending will only take place in the future, the commitment already exist at the time of recognition of the asset.

A real estate company that would build and deliver a new building, is at the same time committing the future users of that building to spend the carbon its need to operate the building. It is that commitment that is the base for the Future Operational carbon liability.

4.4.2. Initial Measurement

Future operational Liability is initially measured in accordance with § 5.2.3

4.4.3. Subsequent Measurements

Future operational liability is subsequently measured in accordance with § 5.2.4

4.4.4. Derecognition

A Future Operational Carbon Liability is derecognized if

(i) the asset to which it related is derecognized under GAAP as a result of a transferer to another entity which will report it as an asset under its applicable GAAP,

(ii) the asset reaches the end of its useful life, and is not expected to produce any further economic value.

The derecognition of a Future Carbon Obligation Liability triggers a counter booking on the Carbon P&L of the reporting entity.

For example in real estate the sale of an appartment building to an institutional investor which will report it in its own balance sheet would trigger the derecognition of the Future Operational Carbon liability under (i) above, however the same appartement being sold to a family would not trigger the derecognition, as the family is not reporting the asset under GAAP. In the latter case the reporting entity would carry the liability up to the end of the expected useful life of the asset.

5. Fair Value.

5.1. Fair Value of an Embedded Carbon Asset.

5.1.1. Scope.

Fair value measurement applies to the measurement of all Embedded Carbon Assets.

5.1.2. Definition of fair value for an Embedded Carbon Asset.

The fair value of an Embedded Carbon Asset represents the current value of the carbon which has already been used to build the existing asset. This value is different from the price that has (or should have been paid) at the time of the construction of the asset.

The fair value of an embedded carbon asset is the theoretical price that would need to be paid at the reporting date to produce an asset that would allow the reporting entity to achieve similar economic benefits then the asset under consideration. The new asset is assumed to be produced by a reasonable market participant using readily available technology.

5.1.3. Measurement

The fair value of an Embedded Carbon Asset is equal to:

$$Embedded\ carbon\ asset\ at\ fair\ value = c\ \times p$$

Where:

c is the amount of carbon that would be needed by a reasonable market participant using readily available technology to produce an asset that would achieve similar economic benefits,

p is the price of carbon at the reporting date.

In the case of the Embedded Carbon Asset related to an existing office building for example, the fair value of the Embedded Carbon Asset would consider the average CO2 emission that is currently achieved in the market where the asset is located for the production of a building of similar size, using the construction technology which is the most commonly used in the market.

5.1.4. Change in the fair value of Embedded Carbon Asset

Changes in fair value of Embedded Carbon Asset is driven either by. (i) a change in the price of carbon or (ii) a change in the technology used to produce the asset.

As carbon usage becomes restricted it is expected that carbon prices will go up, therefore increasing the fair value of Embedded Carbon Assets, while the technology evolution toward a carbon free economy will drive fair value of Embedded Carbon Asset down, as less carbon is needed to replace existing assets.

Assuming the economy manages to translate to a complete carbon free structure then Embedded Carbon Asset value will tend toward zero.

Change in Fair Value are booked in the Carbon balance sheet with the counter booking being reflect on the carbon P&L and shall differentiate between the impact of the change which is driven by the change in carbon price and the impact of the change which is driven by change in the change in the carbon emission needed to replace the asset.

5.2. Fair Value of Carbon Liabilities.

5.2.1. Scope

Fair value of carbon liabilities applies to the liabilities defined in § 4.4 (Future operational carbon liability).

5.2.2. Definition of fair value for a Future Operational Carbon Liability.

The **future operational carbon liability** represents theoretical current value of a future carbon obligation that the reporting entity is committing to, as a result of its ownership of the asset. This represents the future emissions that will take place because of the operation of the asset and are necessary for the asset to fulfill its expected functions. The future operational carbon liability represents the theoretical cost of the future carbon emission of the asset as it is delivering its expected economic value to the reporting entity.

This future operational liability is fair valued, as its current value is depended on (i) the price of carbon at the reporting date and (ii) the valuation parameters used in the determination of the GAAP book value of the associated asset on the GAAP balance sheet of the company (see § 5.2.3)

5.2.3. Measurement

Future operational Liability is initially measured as follow:

The initial measurement of a future operational liability is based on the current location-based emission of the asset over one reporting period. The current level of emission is assumed to be constant over the useful life of the asset.

$$Future\ operational\ carbon\ liability = V(c\ ;p)$$

Where:

$\boldsymbol{c}$ is the amount of carbon would be emitted by the asset during the reporting period,

This amount can either be estimated by the reporting entity for the purpose of the specific asset, or it can be derived from an estimate of the consumption of similar assets already in operation.

$\boldsymbol{p}$ is the market price of carbon at the reporting date,

$\boldsymbol{V}\ (\boldsymbol{c};\boldsymbol{p})$ is the valuation function consistent with the one used to value the underlying asset in the reporting entity GAAP accounts.

The initial measurement of the Future Operational Carbon Liability is recognized on the carbon balance sheet, and balanced by an equivalent counter booking in the entity's carbon P&L.

For example, in the case of a real estate asset which is valued using the "equivalent yield approach" $V(c;\boldsymbol{p})$ would be defined as follow:

$$Future\ operational\ carbon\ liability\ = \frac{a\ \times c\ \times\ p}{EqY}$$

Where:

$\boldsymbol{a}$ is the total lettable area of the asset (sqm),

$\boldsymbol{c}$ is the amount of operational carbon emitted to operate one sqm of lettable area of an equivalent asset (ton/sqm),

$\boldsymbol{p}$ is the market price for one ton of carbon at the reporting date (EUR/ton),

$\boldsymbol{EqY}$ is the individual equivalent yield used in the valuation of the asset at the reporting date for the IFRS financial statement (percent).

5.2.4. Change in the fair value of Future Operational Carbon Liability

Future operational liability is remeasured at each subsequent reporting date using the same approach then for the initial measurement.

Changes in the Future Operational Liability can be driven by either one or a combination of the following:

(i) Change in the emission of the asset (for example as a result of an optimization of the usage of the asset).

(ii) Changes in the price of carbon.

(iii) Change in the underlying parameter used to value the asset under the reporting entity GAAP.

Change in the Future Operational Carbon Liability is booked on the balance sheet with a counter booking entered on the carbon P&L of the entity and shall differentiate between the impact of the change which is driven by:

(i) the change in carbon price which shall be booked through the line-item “Gain/Loss because of the change in carbon price”

and

(ii) the impact of the change which is driven by other valuation factors which shall be booked in their respective line-item

6. Green Dividend

6.1. Definition of Green Dividend.

A green dividend is akin to an equity contribution to the carbon equity of the reporting entity. A green dividend take place when the shareholders of the reporting entity formally decide and instruct the reporting entity to invest a given amount of its profit into climate mitigation actions that the company would have not undertaken solely based on financial considerations.

This model assumes that in its commitment to fund for non-financially viable projects that aim at addressing climate change, the reporting entity is settling its liability which is recorded under the line item “Unpaid Carbon used by the company”

6.2. Initial recognition

The amount of green dividend decided by a company is initially booked in the carbon equity of the reporting entity. An equivalent counter booking is recorded in the line item “Unpaid-carbon used by the company”, thereby reducing this liability.

A Green Dividend is the only option available to a reporting entity to reduce the liability booked under “Unpaid-carbon used by the company”

7. Accounting Treatment – Carbon Profit and Loss

7.1. Carbon Expenses recognition.

Carbon expenses represent the theoretical outflow that would have been born by the reporting entity if it had to pay a price for carbon.

Carbon expenses are recognized in the period where the carbon is emitted by the reporting entity.

Carbon expense calculated as follow:

$$Carbon\ Expense\ = UpC\ x\ Ap$$

Where:

UpC is the amount of Unpaid-carbon emitted by the reporting Entity which is not used for the production of an Embedded Carbon Asset (§ 4.1). For example, for a real estate company, this would be the carbon emitted in order to operate the heating or cooling system of the building. The carbon emitted to replace the heating or cooling system would not qualify to be reported under this line item as it is used to produce an Embedded Carbon Asset (in that example under §4.1.1 (c))

Ap is the mathematical average price of carbon over the reporting period.

In order to allow the user to understand if any "paid-carbon" was also emitted during the reporting period, the reporting entity shall disclose the value of the Carbon Expense calculated on the basis of the full carbon emission (paid and unpaid), the value of the Unpaid-carbon, and the reconciliation between the two values.

7.2. Change in fair value

Change in Fair value according to §5 are recorded through the reporting entity carbon P&L.

In order to provide a better understanding of the dynamics of the change in fair value the P&L of the reporting entity will identify separately

(i) the changes driven by a change in the carbon price which shall be booked through the line-item "Gain/Loss because of the change in carbon price",

(ii) the changes driven by underlying changes in amount of carbon that would be needed by a reasonable market participant using readily available technology to produce an asset that would achieve similar economic benefits (see § 5.1.3) which shall be booked through the line-item “Gain/Loss because of the change in production technology”,

(iii) the changes driven by the first-time valuation at fair value of Embedded Asset which were initially value as Embedded Carbon as a result of company’s activity (see §4.1.2.2), which should be booked through the line item “Carbon Expense as a result of production of carbon assets”

8. Presentation – Chart of accounts

A reporting entity shall present its carbon accounts using the following charts of accounts:

Carbon Balance Sheet - Carbon Assets -
Embedded carbon asset as a result of production
Embedded Carbon asset at fair value
Embedded Carbon deduction for lack of reusability

Total Carbon Assets

Carbon Balance Sheet - Carbon Equity and Carbon Liabilities -
Carbon Retained Earning
Green Dividend
Total Carbon Equity

Unpaid-carbon Acquired by the Company
Unpaid-carbon Used by the Company
Liability linked to future Operational Carbon
Total Carbon Liability

Total Carbon Equity and Liability

Carbon Profit and Loss Statement

Carbon Revenues

Transaction
Gain/Loss as a result of acquisition/sale of operational carbon
Gain Loss as a result of acquisition/sale of Embedded Carbon
Transaction result

Carbon Efficiency
Gain/Loss of Embedded Carbon because of change in production technology
Gain/loss as a result in change in operational carbon efficiency
Gain/Loss as a result increase/decrease of reusability
Efficency result

Carbon Market Price
Gain/loss because of change in carbon price

Carbon Revenues

P&L - Expenses

Carbon Expenses as result of operations of the assets
Carbon expenses as a result of production carbon assets

Carbon Expenses

Carbon Net Income

9. Illustrative Examples (Work in progress)

This chapter contains three illustrated examples taken from the real estate industry in which the accounting treatment of carbon is applied. The examples present the accounting treatment using booking records and postings to T-accounts. Booking and their counter booking are shown with a similar colour to facilitate the reading.

9.1. Example: First time consolidation of a new Embedded Carbon Asset

9.1.1. The Embedded Carbon Asset was acquired through a transaction that does not in itself generate new carbon emissions (§ 4.1.1(a))

Reporting entity A acquires an existing asset with an Embedded Carbon Asset at fair value of 100 CU. The reporting entity further determine that 25% of the asset cannot be further reused in a future production process. Finally, the reporting entity estimate that the total value of the carbon that will be emitted over the useful life of the asset is 30 CU

The following bookings would take place:

	Assets	
Embedded Carbon asset as a result of production		
Embedded Carbon asset at fair value	100	
Embedded Carbon Deduction for lack of reusabiliy		25

	Liabilities	
Unpaid-Carbon Acquired by the Company		100
Unpaid-Carbon Used by the Company		
Liability linked to future Operational Carbon		30

	P&L - Revenues	
Gain/Loss as a result of acquisition/sale of operational carbon		
Gain Loss as a result of acquisition/sale of Embedded Carbon		
Gain/Loss of Embedded Carbon because of change in production technology		
Gain/loss as a result in change in operational carbon efficiency	30	
Gain/Loss as a result increase/decrease of reusability	25	
Gain/loss because of change in carbon price		

	P&L - Expenses	
Carbon Expenses as result of operations of the assets		
Carbon expenses as a result of production of carbon asset		
Check	OK	

Theses bookings would lead to the following final Carbon Balance sheet and Carbon Profit and Loss:

	Assets
Embedded Carbon asset as a result of construction	-
Embedded Carbon asset at fair value	100
Embedded Carbon Deduction for lack of reusabiliy	- 25
Total Carbon Asset	**75**

	Liability
Retained Earning	- 55
Total Carbon Equity	**- 55**
Unpaid Carbon Acquired by the Company	100
Unpaid Carbon Used by the Company	-
Liability linked to future Operational Carbon	30
Total Carbon Liability	-
Total Carbon Equity and Liability	**75**

	P&L - Revenues
Gain/Loss as a result of acquisition/sale of operational carbon	-
Gain Loss as a result of acquisition/sale of Embedded Carbon	-
Gain/Loss of Embedded Carbon because of change in production technology	-
Gain/loss as a result in change in operational carbon efficiency	- 30
Gain/Loss as a result increase/decrease of reusability	- 25
Gain/loss because of change in carbon price	-
Not used	

	P&L - Expenses
Carbon Expenses as result of operations of the assets	-
Carbon expenses as a result of write of of construction carbon	-
Retained Earnings	**- 55**

9.1.2. The Embedded Carbon Asset was produced by the reporting entity in a process that does generate new carbon emissions (§ 4.1.1(a))

Reporting entity B produce a new asset, and emit in the production process carbon for a total value of 100 CU. The reporting entity uses a production process which is representative of the standard production process of its industry. This results in a fair value of 100 CU for the Embedded Carbon Asset produced. The reporting entity further determine that 25% of the asset cannot be further reused in a future production process. Finally, the reporting entity estimate that the total value of the carbon that will be emitted over the useful life of the asset is 30 CU.

The following bookings would take place.

1- Production process

	Assets	
Embedded Carbon asset as a result of production	100	
Embedded Carbon asset at fair value		
Embedded Carbon Deduction for lack of reusabiliy		

	Liabilities	
Unpaid-Carbon Acquired by the Company		
Unpaid-Carbon Used by the Company		100
Liability linked to future Operational Carbon		

	P&L - Revenues	
Gain/Loss as a result of acquisition/sale of operational carbon		
Gain Loss as a result of acquisition/sale of Embedded Carbon		
Gain/Loss of Embedded Carbon because of change in production technology		
Gain/loss as a result in change in operational carbon efficiency		
Gain/Loss as a result increase/decrease of reusability		
Gain/loss because of change in carbon price		

	P&L - Expenses	
Carbon Expenses as result of operations of the assets		
Carbon expenses as a result of production of carbon asset		
Check	OK	

2- Fair value of the asset at the end of the production process

	Assets	
Embedded Carbon asset as a result of production		100
Embedded Carbon asset at fair value	100	
Embedded Carbon Deduction for lack of reusabiliy		25

	Liabilities	
Unpaid-Carbon Acquired by the Company		
Unpaid-Carbon Used by the Company		
Liability linked to future Operational Carbon		30

	P&L - Revenues	
Gain/Loss as a result of acquisition/sale of operational carbon		
Gain Loss as a result of acquisition/sale of Embedded Carbon		
Gain/Loss of Embedded Carbon because of change in production technology		
Gain/loss as a result in change in operational carbon efficiency	30	
Gain/Loss as a result increase/decrease of reusability	25	
Gain/loss because of change in carbon price		

	P&L - Expenses	
Carbon Expenses as result of operations of the assets		
Carbon expenses as a result of production of carbon asset	100	100
Check	OK	

Theses bookings would lead to the following final Carbon Balance sheet and Carbon Profit and Loss:

	Assets
Embedded Carbon asset as a result of construction	-
Embedded Carbon asset at fair value	100
Embedded Carbon Deduction for lack of reusabiliy	- 25
Total Carbon Asset	**75**

	Liability
Retained Earning	- 55
Total Carbon Equity	**- 55**
Unpaid Carbon Acquired by the Company	-
Unpaid Carbon Used by the Company	100
Liability linked to future Operational Carbon	30
Total Carbon Liability	-
Total Carbon Equity and Liability	**75**

	P&L - Revenues
Gain/Loss as a result of acquisition/sale of operational carbon	-
Gain Loss as a result of acquisition/sale of Embedded Carbon	-
Gain/Loss of Embedded Carbon because of change in production technology	-
Gain/loss as a result in change in operational carbon efficiency	- 30
Gain/Loss as a result increase/decrease of reusability	- 25
Gain/loss because of change in carbon price	-
Not used	

	P&L - Expenses
Carbon Expenses as result of operations of the assets	-
Carbon expenses as a result of write of of construction carbon	-
Retained Earnings	**- 55**

At the end of the two transactions described above, the two-reporting entity own the same asset. Their total assets and liabilities are the same. The only difference is that reporting entity A have book 100 CU as “Unpaid-Carbon acquired by the company” while reporting entity B have booked the same 100 CU as “Unpaid-Carbon acquired by the company”.

This reflects the fact that whole they own a similar asset, reporting entity A did not take part in the decision that led to the production of the asset and to the emission of carbon, but merely acquired an existing asset. While reporting entity B decided to produce the asset and took an active part in the emission of carbon during the production process.

9.2. Example: Derecognition of an Embedded Carbon Asset

9.2.1. The Embedded Carbon Asset was acquired through a transaction that does not in itself generate new carbon emissions (§ 4.1.1(a))

Reporting entity A decides to sell the asset it has acquired previously (see § 9.1.1) to an entity that will report it under GAAP. Following this transaction reporting entity A would have sold all of its assets,

The following booking would take place:

	Assets			Liabilities	
Embedded Carbon asset as a result of production			Unpaid-Carbon Acquired by the Company	100	
Embedded Carbon asset at fair value		100	Unpaid-Carbon Used by the Company		
Embedded Carbon Deduction for lack of reusabiliy	25		Liability linked to future Operational Carbon	30	

	P&L - Revenues			P&L - Expenses	
Gain/Loss as a result of acquisition/sale of operational carbon			Carbon Expenses as result of operations of the assets		
Gain Loss as a result of acquisition/sale of Embedded Carbon			Carbon expenses as a result of production of carbon asset		
Gain/Loss of Embedded Carbon because of change in production technology					
Gain/loss as a result in change in operational carbon efficiency		30	Check	OK	
Gain/Loss as a result increase/decrease of reusability		25			
Gain/loss because of change in carbon price					

Theses bookings would lead to the following final Carbon Balance sheet and Carbon Profit and Loss:

	Assets		Liability
		Retained Earning	-
		Total Carbon Equity	-
Embedded Carbon asset as a result of construction	-	Unpaid Carbon Acquired by the Company	-
Embedded Carbon asset at fair value	-	Unpaid Carbon Used by the Company	-
Embedded Carbon Deduction for lack of reusabiliy	-	Liability linked to future Operational Carbon	-
		Total Carbon Liability	-
Total Carbon Asset	-	**Total Carbon Equity and Liability**	- OK

	P&L - Revenues
Gain/Loss as a result of acquisition/Sale of operational carbon	-
Gain/loss as a result of change in carbon price	-
Gain Loss as a result of acquisition/sale of Embedded Carbon	-
Gain/Loss of Embedded Carbon as a result of change in construction technology	-
Gain/loss as a result in change in operational carbon efficiency	-
Gain Loss as a result of change in usability	-
Not used	

	P&L - Expenses
Carbon Expenses as result of operations of the assets	-
Carbon expenses as a result of write of of construction carbon	-
Retained Earnings	-

9.2.2. The Embedded Carbon Asset was produced by the reporting entity in a process that does generate new carbon emissions (§ 4.1.1(b))

Reporting Entity B decides to sell the asset it has previously produced (see §9.1.2) to an entity that will report it under GAAP. Following this transaction reporting entity B would have sold all of its assets.

The following booking would take place:

	Assets			Liabilities	
Embedded Carbon asset as a result of production			Unpaid-Carbon Acquired by the Company		
Embedded Carbon asset at fair value		100	Unpaid-Carbon Used by the Company		
Embedded Carbon Deduction for lack of reusabiliy	25		Liability linked to future Operational Carbon	30	

	P&L - Revenues			P&L - Expenses	
Gain/Loss as a result of acquisition/sale of operational carbon			Carbon Expenses as result of operations of the assets		
Gain Loss as a result of acquisition/sale of Embedded Carbon	100		Carbon expenses as a result of production of carbon asset		
Gain/Loss of Embedded Carbon because of change in production technology					
Gain/loss as a result in change in operational carbon efficiency		30	Check	OK	
Gain/Loss as a result increase/decrease of reusability		25			
Gain/loss because of change in carbon price					

Theses bookings would lead to the following final Carbon Balance sheet and Carbon Profit and Loss:

	Assets		Liability
		Retained Earning	- 100
		Total Carbon Equity	**- 100**
Embedded Carbon asset as a result of construction	-	Unpaid Carbon Acquired by the Company	-
Embedded Carbon asset at fair value	-	Unpaid Carbon Used by the Company	100
Embedded Carbon Deduction for lack of reusabiliy	-	Liability linked to future Operational Carbon	-
		Total Carbon Liability	-
Total Carbon Asset	-	**Total Carbon Equity and Liability**	-

	P&L - Revenues
Gain/Loss as a result of acquisition/sale of operational carbon	-
Gain Loss as a result of acquisition/sale of Embedded Carbon	- 100
Gain/Loss of Embedded Carbon because of change in production technology	-
Gain/loss as a result in change in operational carbon efficiency	-
Gain/Loss as a result increase/decrease of reusability	-
Gain/loss because of change in carbon price	-
Not used	

	P&L - Expenses
Carbon Expenses as result of operations of the assets	-
Carbon expenses as a result of write of of construction carbon	-
Retained Earnings	**- 100**

At the end of the two transaction, both entity A and entity B have sold their asset. However, while entity A ends up with an empty balance sheet (with no asset or liability), entity B still carries a 100 CU "Unpaid-Carbon liability used by the company" and an equivalent negative equity of 100 CU.

This reflects the facts that across all the transaction described, entity A never took an active part in any process that resulted in carbon emission, and as such never itself emitted carbon. On the other hand,

entity B, took an active part in producing an asset and emitted carbon in that process. As such its "Unpaid-Carbon liability used by the company" remains on its Carbon balance sheet, even though the asset its produced using that carbon was sold.

10. Conceptual framework for a real estate company

RECAP : the asset life cycle

During the construction carbon is emitted, a new asset is being built, and a commitment to use carbon in the future operation of the asset is created.

- Carbon used by the construction
- Embedded Carbon Asset is created
- Future Operational Carbon liability is created

During the operation of the asset

- Carbon used in the day to day energy consumption

During the lifetime of the asset it will be refurbished therefore using carbon for construction, but not creating any additional asset

- Carbon used by the construction

At the end of the life of the asset if destroyed :

- Embedded Carbon Asset is lost
- Future Operational Carbon Liability is erased

Real Estate Carbon Accounting Principle

RECAP : the conceptual framework

Embedded Carbon Value:

Not the price of the carbon used to build the building, but the carbon value of the building for the future. The price that would need to be paid for the carbon to rebuild a building of that size with the current average construction technique.

For example: A building which is built with carbon efficient technology will have a Embedded Carbon Value than the construction costs.

Future Carbon Operational Liability:

The current annual operational emissions capitalized using the same equivalent yield than in the valuation of the asset.

As a consequence the more valuable the asset (the lower the equivalent yield) the higher the impact of using carbon will be. An improvement in the operational efficiency will reduce the future liability.

Real Estate Carbon Accounting Principle

RECAP : the conceptual framework

alstria

Unpaid Carbon

In the absence of a carbon tax, the carbon used in the operation of the company or which is Embedded in its assets is an unpaid externality which has been privatized.

The framework distinguish two kind of Unpaid Carbon:

Unpaid Carbon used by the company

This reflect the value of the carbon actually emitted by the company taking into consideration any offsetting measure already in place (“Market based approach”), or any Green Dividend not paid.

Unpaid Carbon acquired by the company

This is the value of the Embedded Carbon assets that have been acquired by the company (i.e the company is using the asset but was not the one that emitted the carbon in the first place).

Carbon Equity

Represent the amount that the company would need to pay today (If negative), or would gain (if positive) if carbon had a value.

Real Estate Carbon Accounting Principle