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General principles for the environmental labelling of consumer products

Methodological standard for the environmental assessment for Internet Service Provision (ISP)

February 2023

FAITS & CHIFFRES

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1. Scope of the standard

1.1. Purpose of the document

The Product Category Rules (PCR) provide the method for calculating the environmental labelling indicators of a product category. The environmental labelling objectives are as follows:

- Inform consumers about the environmental impacts of the products and services they buy
- Direct consumer demand towards more environmentally friendly products
- Thereby encourage producers to ensure a more environmentally friendly design of their products so as to limit their impact on the environment.

The category rules are an adaptation of the repository of best practices BP X 30-323-0 "General principles for an environmental communication on mass market products".
The category rules adapt the items set out in Article A.1 paragraph 1 of the repository of best practices BP X 30-323-0. The repository of best practices BP X 30-323-0 states as a guiding principle that the assessment of the environmental impacts of products should be developed in accordance with the life cycle approach and the multi-criteria approach.

This document supplements and clarifies the sectoral rules of the "parent" PCR: "Methodological standard for the environmental assessment of digital services" for the case of telecommunication networks and internet access provision, and should be read in parallel.

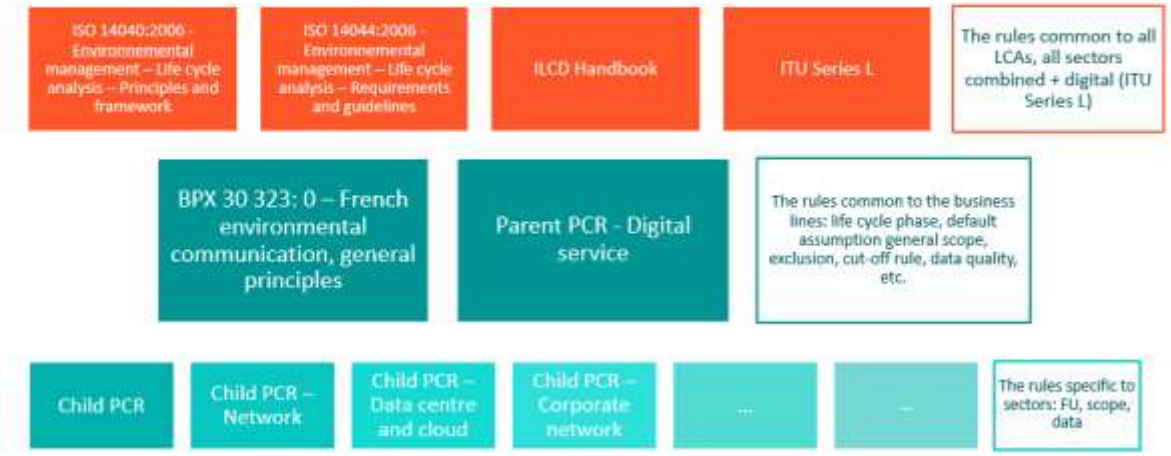


Figure 1 – Positioning of the standard in the global standard context

This PCR is produced based on the same methods as the recognised standards in the digital sector, namely:

- IT equipment PEF
- ITU Series L, and specifically L.1410

The ITU L.1410 standard indicates the different stages in a digital service LCA, and those covered by the standard. The figure below summarises these stages and indicates those covered by this PCR and its "parent" PCR.

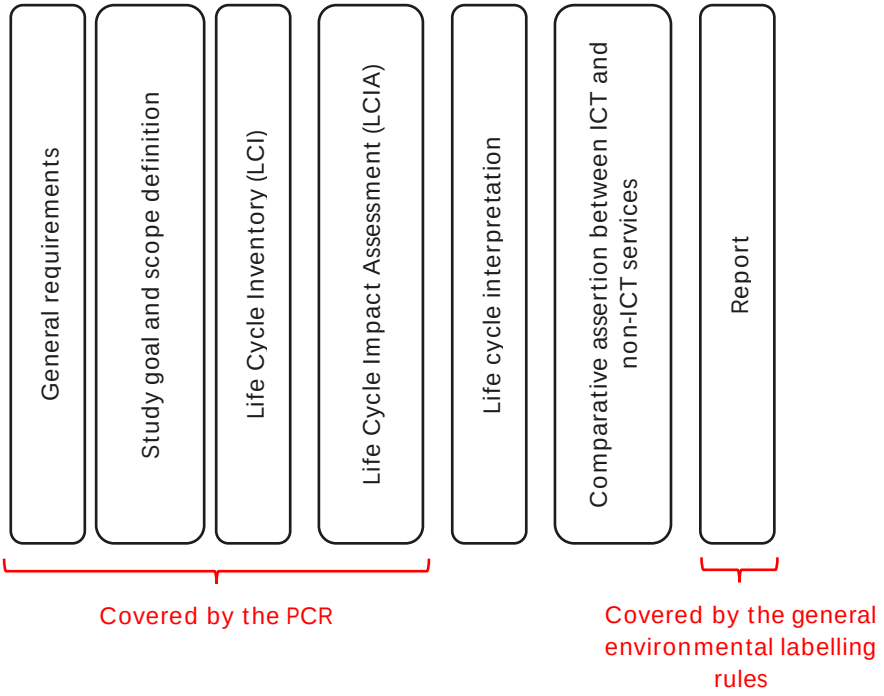


Figure 2 – Stages covered by the PCR, taken from standard ITU L.1410

1.2. Area of application

This standard is specifically dedicated to the environmental assessment of **internet service provision services**.

Its aim is to:

- Provide a framework for the method of assessing the environmental impacts of these services;
- Simplify the calculation method to make environmental labelling easier for companies that market them;
- Serve as a method for applying paragraph III of article 13 of law no. 2020-105 of 10 February 2020 on the fight against waste for a circular economy, known as the AGEC law.

This standard brings together the elements needed to calculate the environmental impacts of digital services as defined below.

A digital service is an activity characterised by the performance of a service or the provision of information using a set of digital equipment and infrastructure to capture, circulate, process, analyse, restore and store data. This equipment and infrastructure are characterised in three "physical parts/tiers": terminals, telecommunication networks and IT centres; a set of software being used at different levels to "orchestrate" the physical equipment and deliver the expected service.

Although this activity is linked to one or more physical products (terminals, networks, servers), it is transitory, often intangible in nature and does not normally result from the possession of one of the products.
These activities can be carried out between companies, individuals, administrations, communities and other entities without restriction.

Associated CPA codes (2008): See Annex H – List of CPA codes concerned
Note: the list of CPA codes is not suitable for the categorisation of digital services. It is provided as a reminder, but is not an exhaustive list.

1.3. Positioning in relation to standard ITU L.1410 / ETSI 203 199

See the "Methodological standard for the environmental assessment of digital services" PCR: no change.

2. Display unit

2.1. Functional unit

In the framework of art. 13.III of the AGEC law, the functional unit chosen is the following:

"Access the internet on a fixed or mobile network by subscription, consuming X GB during one month"

The definition of this functional unit is based on the following questioning:

The function performed/service rendered: "What?"	Access the internet
The scope of the function or service: "How much/many?"	for 1 subscription, consuming X GB *Consumption to be adapted*
The required level of quality: "How?"	on fixed/mobile network *to be adapted according to the characteristics (fixed/mobile)*
The lifespan of the product: "How long?"	for one month[1]

Table 1: Definition of the functional unit under the AGEC law

Note: For the purposes of this document, accessing the internet refers to all of the network infrastructures that enable a user device (smartphone, computer, etc.) to connect to the internet, which encompasses all of the world's computer networks. In this sense, digital services based on the provision of internet access (private networks, global operator networks, data centres, etc.) are excluded.

2.2. Block diagram and flow diagram

In order to understand what a digital service is, it is necessary to establish a block diagram and a flow diagram of the digital service in question.

- **The block diagram** indicates the main sets of equipment or sites used to perform the digital service.
- **The data flow diagram** shows the connection and the use of each of these sets through the use of the digital service.

A block diagram of the connection between the different PCRs of a digital service is available below.

While the functional diagram proposed in this document is an overview of the network components in 2022, it will need to be supplemented by a map and a characterisation of the networks used by the operator.

The flow chart is not relevant for these sector rules defined in this document, as they address the network part (level 2) rather than a digital service as a whole (level 1).

The minimal approach adopted is the screening approach.

[1] The period of one month corresponds to the duration defined as part of the AGEC law and necessary for the communication. However, the calculations are made over a period of one year to avoid seasonal variations (subsequently reduced to monthly)

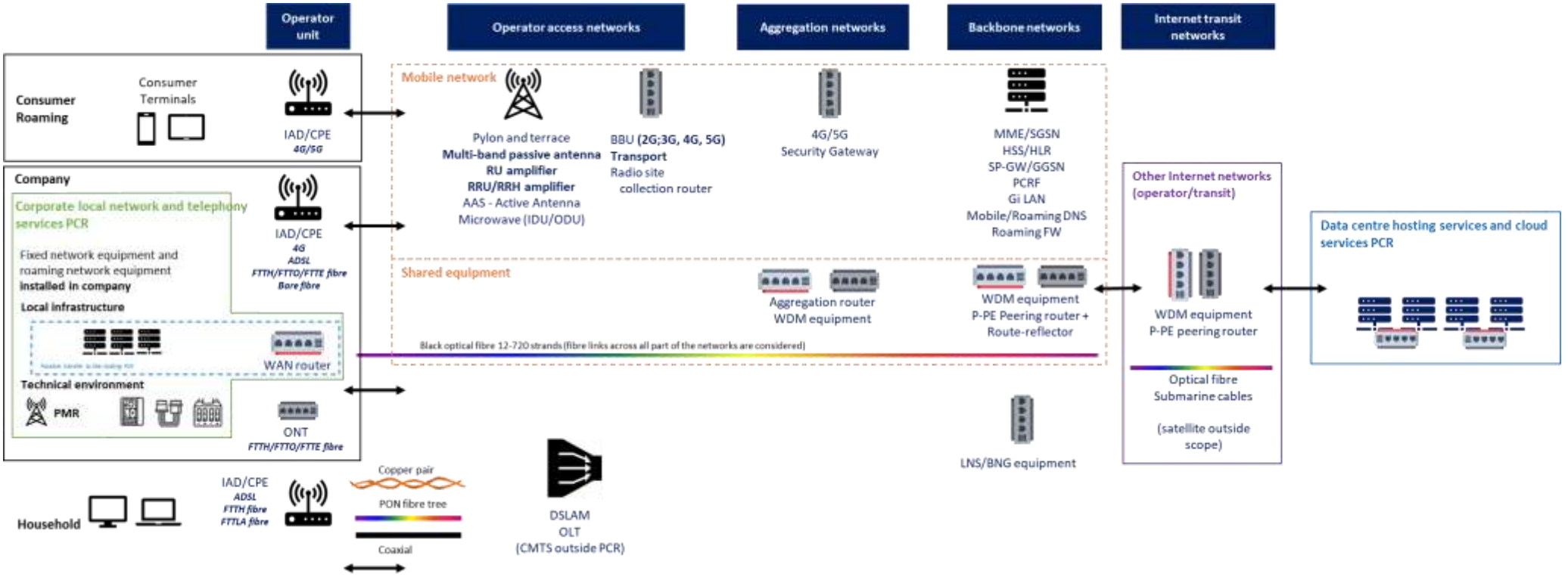


Figure 3 - Block diagram of the connection between the different PCRs of a digital service

Keys:

Orange: Operator network as a whole in the ISP PCR scope

Blue: Distribution of equipment between the different parts of the networks (Access, Aggregation and Backbone)

⟷ Data exchange

3. System boundaries

3.1. Stages and flows included

The environmental assessment of products covered by this standard should take into account the life cycle stages and processes specified in this chapter.

The tiers of the digital services considered, as well as the possible levels of analysis, are the following:

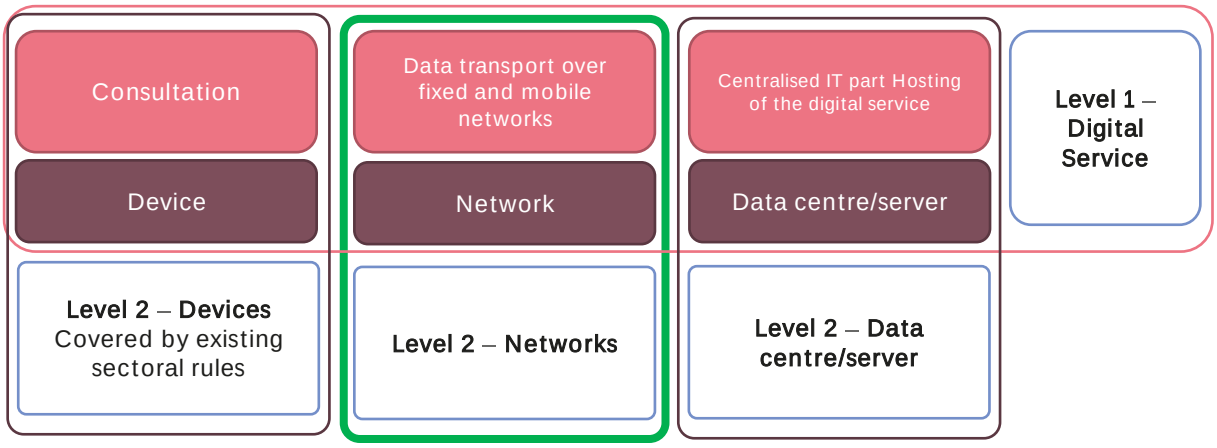


Figure 4 - Analysis levels of the "child" PCR

These "child" sectoral rules, indicated by the green outline, cover the following level: Level 2 – Networks

For all equipment items of each tier (device, network, data centre/server), as well as for the systems of each tier, the following life cycle stages must be taken into account:

Environmental labelling	ITU L.1410		Coverage by the PCR
Life cycle stage	Tag	Life cycle stage	
Manufacture, distribution & installation	A	Raw material acquisition	
	A1	Raw material extraction	Mandatory
	A2	Raw material processing	Mandatory
	B	Production	
	B1	ICT good production	
	B1.1	Parts production	Mandatory
	B1.2	Assembly	Mandatory
	B1.3	ICT manufacturer support activities	Not taken into account
	B2	Support goods manufacturing	
	B2.1	Support goods manufacturing	Mandatory
	B3	Construction of ICT-specific site	
	B3.1	Construction of ICT-specific site	Mandatory
Use	C	Use	
	C1	ICT goods use	Mandatory
	C2	Support goods use	Mandatory
	C3	Operator support activities	Mandatory
	C4	Service provider support activities	Mandatory
End of life	D	Goods end-of-life treatment	
	D1	Preparation of ICT goods for reuse	Mandatory
	D2	ICT-specific EoLT Support goods EoLT?	
	D2.1	Storage / Disassembly / Dismantling / Shredding	Mandatory

Table 2: Life cycle scope

Note: The tags are based on the ITU L.1410 standard. Not to be confused with the EN 15804 standard despite the similarity of the tags.

3.2. Exclusion

The development and application of the standard is iterative. Specifically for these sectoral rules, elements that may supplement the internet access service are excluded from the environmental assessment of this version, namely:

- Set top boxes (STBs), physical or virtual
- TV units
- Wi-Fi repeaters
- Internet access via satellite
- Fixed wireless access (FWA) connections
- The upgrade of equipment
- The design and research and development work for each equipment item
- The materials and tools required for installation or maintenance

3.3. Reference flow

Impacts related to the manufacture and distribution of equipment are considered to be fully accounted for in the year of purchase, and not allocated/amortised over their lifetime.

There were two reasons for this methodological choice:
- a desire to get closer to the actual impact at a given time. All of the environmental impacts to produce an equipment item in a given year occurred in that same year. Lifetime depreciation does not reflect a physical reality and could, for example, minimise the environmental impacts of equipment renewal;
- a generally accountable life span of an equipment item, which does not encourage the extension of its life span or the use of refurbished equipment.

The problem of data collection for the current year remains a considerable challenge for operators. It was therefore decided to take into account the equipment installed in year y-1 at the France level to facilitate the collection of data on the manufacture, distribution and installation phases, as well as the end-of-life phase, which takes into account the fate and level of collection of equipment dismantled during the previous year.

4. Allocation rules

4.1. Background and objectives

From 1 January 2024, internet service providers and telecoms operators (physical and virtual) for fixed and mobile networks must inform their subscribers of the amount of data consumed and indicate the equivalent in greenhouse gas emissions. This methodology must take into account the greenhouse gas emissions from each of the life cycle stages mentioned in this document of the equipment concerned.

The telecoms network, both fixed and mobile, is a system involving a multitude of equipment, processes and services managed by a set of operators. These elements are distinctive in that they are shared on certain branches of the network. There are two possible levels of sharing:

- **Sharing at the network level**: The network elements may be either dedicated to one of the two fixed or mobile networks (in which case there is no sharing) or used for the operation of both networks (in which case there is sharing).
- **Sharing at the operator level**: The network elements owned by an operator may either be used by the operator for its own use for its subscribers (in which case there is no sharing) or used by other operator(s) (in which case there is sharing).

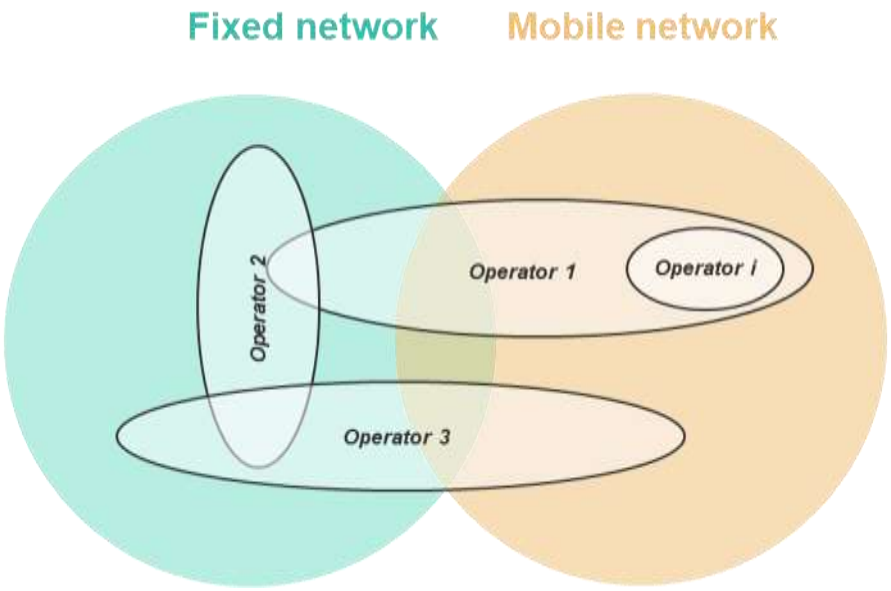


Figure 5- Simplified illustration of the sharing of the telecoms network (fixed and mobile) managed by different operators

The telecoms network is therefore a complex system that does not make it possible to directly calculate the environmental impact of fixed and mobile networks at the level of each operator.

To enable each operator to achieve the final environmental communication of informing its subscribers of the environmental impact of the fixed and mobile network according to their data consumption, while taking into account the shared elements, allocation rules need to be defined.

Applied in a coordinated manner, these allocation rules should make it possible to:

- Divide the environmental impacts of each element of the networks into those that depend on the amount of data exchanged on the network and those that do not,
- Allocate the environmental impacts to each operator for the network elements that are shared,
- Express the environmental impacts at the desired functional unit.

4.2. Presentation of the environmental model

To enable allocation rules to be applied to the telecoms network, an environmental model was created. This theoretical model is based on two distributions defined below:

- **Distribution 1:** Distribution of telecoms network elements according to an a×x+b model
- **Distribution 2:** Representation of the network elements according to six categories

Figure 6- Illustration of the main distributions of the environmental model

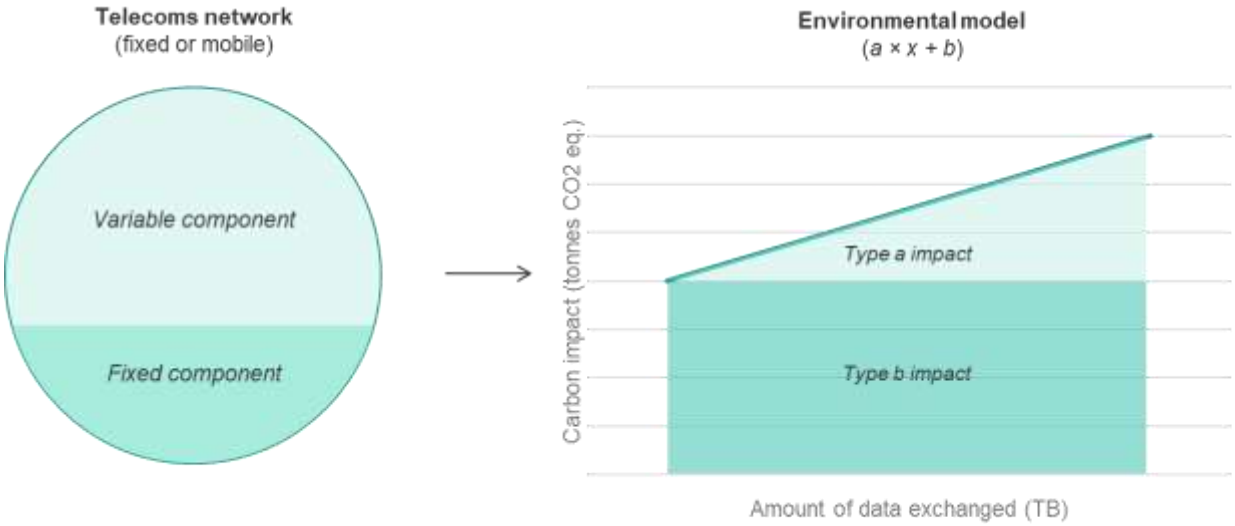
4.2.1. Distribution 1: Distribution of network elements according to an ax+b model

It was agreed by the operators that the environmental impact over the whole life cycle of a telecoms network (fixed or mobile) is mainly due to two components:

- A **variable component** depending on the amount of data exchanged on the network by users
- A **fixed component** depending on the number of users on the network

This modelling proposal aims to simplify the impact calculations, through a linear representation.

Applying this principle, the environmental impacts of fixed and mobile networks can be represented according to the following environmental model:



Key:

- **a**: Leading coefficient related to the amount of data exchanged on the network
- **x**: Amount of data exchanged on the network by a user
- **b**: Origin ordinates corresponding to network impacts in the absence of data exchange on the network

Figure 7 - Model of the distribution of the environmental impacts of network elements according to an ax+b model

To determine the values a and b, it is recommended to combine a statistical approach and an analytical approach. As there are not yet enough measurement points (or field data) to build a statistical model, an **analytical approach** has been adopted.

This analytical approach is based on the application of an **allocation rule** distributing each network element according to a ratio [a;b]:

- Ratio [100%; 0%]: the environmental impacts of the element in question are 100% dependent on the amount of data exchanged on the network.
- Ratio [0%; 100%]: the environmental impacts of the element in question are 100% dependent on the number of subscribers in the network.
- Ratio [xx%; yy%]: the environmental impacts of the element in question are xx% dependent on the amount of data exchanged on the network and yy% dependent on the number of subscribers on the network (xx% + yy% = 100%).

(a,b)

Note: The allocation rule distributing each network element according to a ratio [a;b] is presented in detail in section 4.4.3.

4.2.2. Distribution 2: Representation of the network elements according to six categories

We consider that the elements of the telecoms network can be classified into **six categories** depending on:

- The **type of network**:
  - **"Fixed part"**: the part of the telecoms network used strictly for the operation of the fixed network.
  - **"Mobile part"**: the part of the telecoms network used strictly for the operation of the mobile network.
  - **"Fixed + mobile part"**: the part of the telecoms network used for the operation of both the fixed network and the mobile network.
- The **type of use**:
  - **"Single-operator use"**: element of the telecoms network managed by an operator whose end use is solely for its subscribers.
  - **"Multi-operator use"**: element of the telecoms network managed by an operator whose end use is for subscribers attached to one or more operators.

  Special case: In the event that an operator is not able to differentiate between single- and multi-operator use, the network element will by default be considered as **multi-operator** use. The operator must be able to justify this situation.

  .

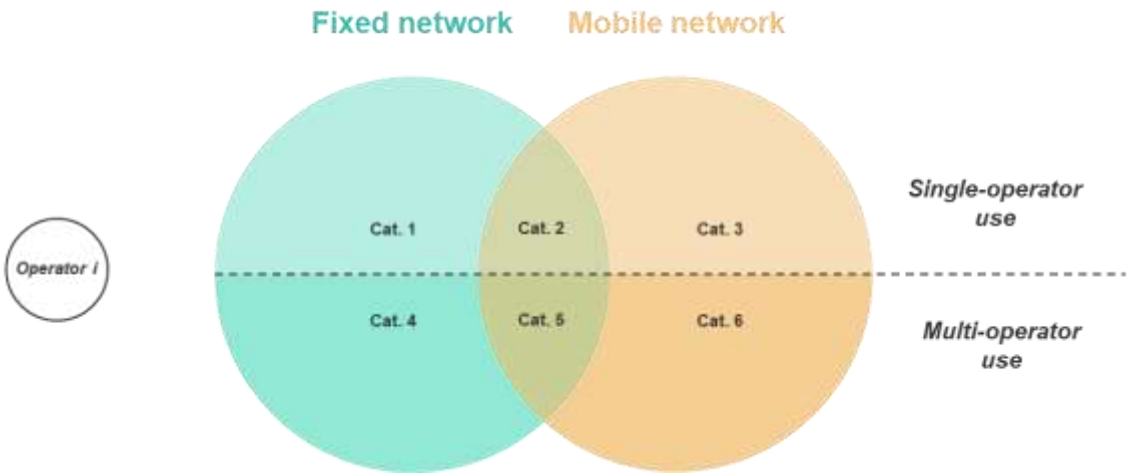


Figure 8- Representation model of shared network elements

Key:

- Category 1: Network element managed by an operator i used for the operation of the **fixed network** for **single-operator use**
- Category 2: Network element managed by an operator i used for the operation of the **fixed and mobile network** for **single-operator use**
- Category 3: Network element managed by an operator i used for the operation of the **mobile network** for **single-operator use**
- Category 4: Network element managed by an operator i used for the operation of the **fixed network** for **multi-operator use**
- Category 5: Network element managed by an operator i used for the operation of the **fixed and mobile network** for **multi-operator use**

- Category 6: Network element managed by an operator i used for the operation of the **mobile network** for **multi-operator use**

The network elements associated with categories 2, 4, 5 and 6 are shared equipment ("between fixed and mobile networks" and/or "multi-operator use"). An **allocation rule** will be applied to allocate these elements to each operator:

- **Type of allocation**:
    - The "type a" variable component of the environmental impacts of the equipment (defined in the first stage) will be allocated in proportion to the volume of data through the equipment.
    - The "type b" fixed component will be allocated according to the number of subscribers using the equipment. The number of subscribers considered will be the average number in year y-1.
- **Scope of the allocation:**
    - Category 2: the volume of data exchanged and the number of subscribers are relative to the operator in question on the fixed and mobile network.
    - Category 4: the volume of data exchanged and the number of subscribers are relative to all operators sharing the fixed network.
    - Category 5: the volume of data exchanged and the number of subscribers are relative to all operators sharing the fixed and mobile network.
    - Category 6: the volume of data exchanged and the number of subscribers are relative to all operators sharing the mobile network.

Since the network elements associated with categories 1 and 3 are by definition non-shared, no allocation rules are required.

Example: In the case of BBU equipment that is on an installation shared between operators (RAN-sharing), the operator must position this equipment in category 6 (mobile network).

Note: The allocation rule applied to categories 2, 4, 5 and 6 of the network is detailed in section 4.4.3.

4.2.3. Summary of distributions 1 & 2

The two distributions will lead to a recomposition of the environmental impacts:

- On an **individual** operator basis for the fixed and mobile networks
- **According to an ax+b model** allowing calculation at the subscriber level according to its consumption of exchanged data

Figure 9- Illustration of the main distributions proposed for the environmental model

4.3. Assessment period and communication period

Under the regulation, the operator will have to update its network environmental assessment model every year with the most recent data defined in this document (renewal of equipment, purchases, etc.).

For reasons of equipment sharing and therefore information sharing between operators, operators must collect their data and update their model at the same time of the year.
The operators will follow the succession of these three periods:

- The collection and measurement period is from 1 January to 31 December (year y-1) each year. This stage is established over a full year, notably because the energy consumption of the operated networks will need to be based on energy consumption measurements over a period of 12 months in order to take variations into account (climatic, traffic, behaviour). The objectives of the assessment period include:
    - Collecting data on equipment purchased or serviced (impacts linked to manufacture/distribution/maintenance/end of life)
    - Annual electricity consumption measurement (impacts related to the user phase of an operator's network)
- The assessment period is from 1 January to 31 December (year y) each year. The objective of this period is to aggregate the data collected over year y-1, share between the operators the data relating to shared equipment and assess the impacts according to the methodology of the standard defined in part 4.4.
- The communication period is from 1 January to 31 December (of year y+1).

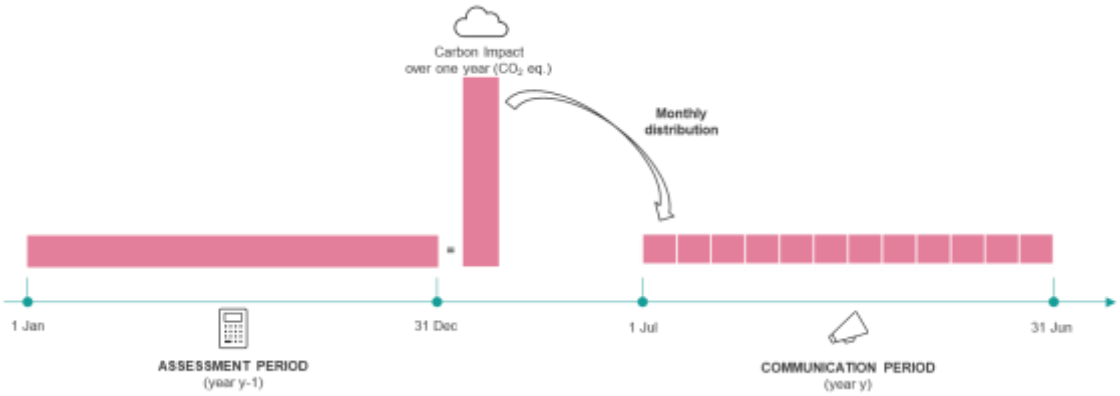


Figure 10- Results collection, assessment and communication period

4.4. Application of the environmental model

4.4.1. Steps

The allocation rules should be applied as follows:

- **Input data:** Collection of primary data and calculation of the environmental impacts of the network elements over the assessment period (year y-1), then classification into the six categories.
- **Step 1:** Application of the allocation rule to all network elements for a distribution of data by coefficient of the macro-model (a, b)
- **Step 2:** Exchange of intermediate results between operators
- **Step 3:** Application of the specific allocation rule to shared equipment
- **Step 4:** Application of the allocation rules to reduce the environmental impacts to the functional unit level
- **Final communication:** Communication of the environmental impacts for operator i on the network in question at the level of a subscriber according to its monthly amount of data exchanged over the communication period (year y+1)

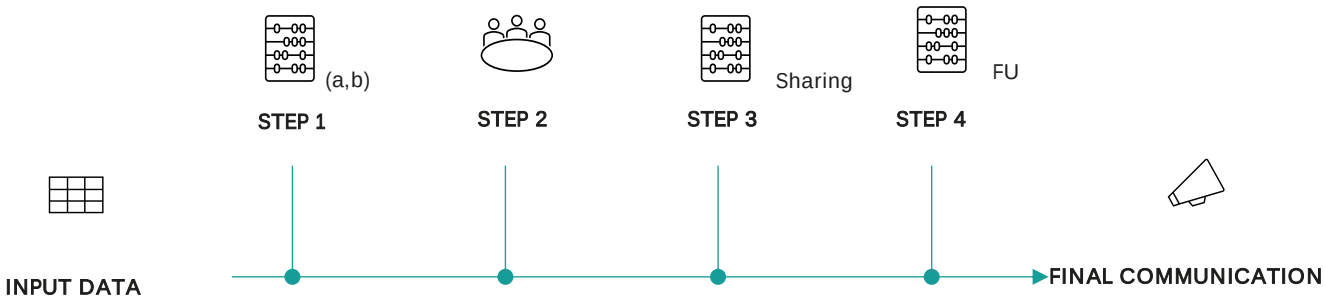


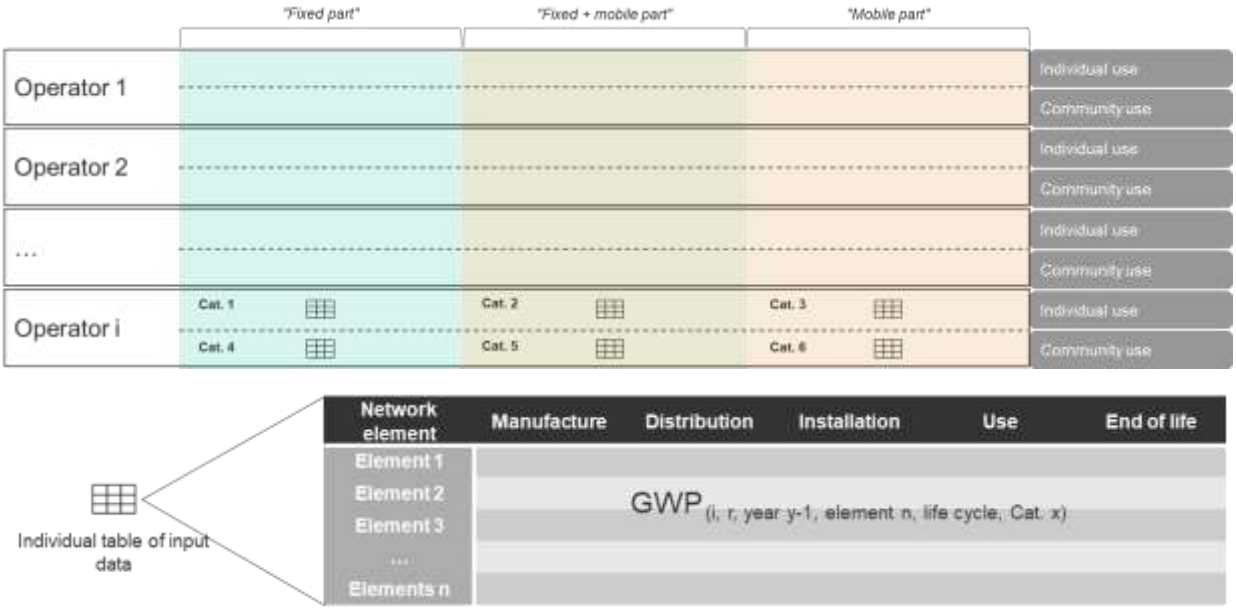
Figure 11- Process of applying allocation rules

4.4.2. Input data

Within the boundaries of the system and the rules and assessment methods of the ISP standard, each operator will have to calculate the environmental impact of the network elements under its responsibility. The impacts will be calculated using a life cycle approach and representative of the assessment period (year y-1).

The environmental impacts of the network elements, formalised in individual tables, will be classified according to the six categories as defined in distribution 2 (see section 4.2.2).

Note: The number of elements n in the network varies between operators.



GWP input data $_{(i, r, year\ y\text{-}1, element\ n, life\ cycle, Cat.\ x)}$ are stated in tonnes of CO_2 eq.

Figure 12- Input data for operator i before step

4.4.3. Step 1: Allocation of equipment according to the type of coefficient (a,b) of the environmental model

The environmental impacts of the telecoms network equipment, processes and services (see results input table) will be assigned to the environmental model taking into account the following allocations:

- **Fixed network**

Technology	Equipment family	Manufacture		Distribution		Installation		Use		End of life	
		Type a	Type b	Type a	Type b	Type a	Type b	Type a	Type b	Type a	Type b
ACCESS											
Common	Collection router/switch on OCN and/or SCN site	100	0	100	0	100	0	20	80	100	0
FTTH fibre	ONT (external)	0	100	0	100	0	100			0	100
	DSLAM/OLT	0	100	0	100	0	100			0	100
AGGREGATION											
All types	Aggregation router	100	0	100	0	100	0	20	80	100	0
	Aggregation loop WDM equipment	100	0	100	0	100	0			100	0
BACKBONE & CORE NETWORK											
All types	WDM backbone equipment	100	0	100	0	100	0	20	80	100	0
	P-PE peering router	100	0	100	0	100	0			100	0
	Fixed DNS	100	0	100	0	100	0			100	0

Table 3- Fixed network equipment allocation rules according to the type of coefficient (a,b) of the environmental model

Specific case of units

Technology	Equipment family	Manufacture		Distribution		Installation		Use		End of life	
		Type a	Type b	Type a	Type b	Type a	Type b	Type a	Type b	Type a	Type b
UNIT											
ADSL	IAD/CPE unit with integrated Wi-Fi router	0	100	0	100	0	100	5	95	0	100
FTTH fibre	IAD/CPE unit	0	100	0	100	0	100			0	100

	without ONT/SFP										
	IAD unit with integrated ONT/SFP (Wi-Fi router with integrated ONT or SFP)	0	100	0	100	0	100			0	100
FTTLA fibre	IAD unit/CPE cable (Wi-Fi router with integrated DOCSIS modem)	0	100	0	100	0	100			0	100

Table 4- Unit allocation rules according to the type of coefficient (a,b) of the environmental model

- **Mobile network**

Technology	Equipment family	Manufacture		Distribution		Installation		Use		End of life	
		Type a	Type b	Type a	Type b	Type a	Type b	Type a	Type b	Type a	Type b
ACCESS											
Common	Multi-band passive antenna (1.4 to 2.7 m)	0	100	0	100	0	100	40	60	0	100
	RU amplifier (700, 800, 900, 1800, 2,100, 2,600 MHz)	35	65	35	65	35	65			35	65
	RRU/RRH amplifier (1,800, 2,100, 2,600 MHz)	35	65	35	65	35	65			35	65
	RRU/RRH amplifier (700, 800, 900 MHz)	35	65	35	65	35	65			35	65
2G (GSM)	2G BBU	0	100	0	100	0	100			0	100
3G (UMTS)	3G BBU	0	100	0	100	0	100			0	100
4G (LTE)	4G BBU	60	40	60	40	60	40			60	40
5G (NR)	5G BBU	100	0	100	0	100	0			100	0
	AAS - Active Antenna 3.5 GHz	100	0	100	0	100	0			100	0
Transport	Radio site collection router	100	0	100	0	100	0			100	0
	Microwave ODU - Passive antenna	0	100	0	100	0	100			0	100
	Microwave ODU - RF Amplifier	0	100	0	100	0	100			0	100
	Microwave IDU	0	100	0	100	0	100			0	100
AGGREGATION											
All types	Aggregation router	100	0	100	0	100	0	100	0	100	0
	Aggregation loop WDM equipment	100	0	100	0	100	0			100	0

	4G/5G security gateway	100	0	100	0	100	0			100	0
BACKBONE & CORE NETWORK											
All types	WDM backbone equipment	100	0	100	0	100	0	100	0	100	0
	P-PE peering router	100	0	100	0	100	0			100	0
	MME/SGSN	0	100	0	100	0	100			0	100
	HSS/HLR	0	100	0	100	0	100			0	100
	SP-GW/GGSN	100	0	100	0	100	0			100	0
	PCRF	100	0	100	0	100	0			100	0
	Gi LAN	100	0	100	0	100	0			100	0
	Mobile/Roaming DNS	100	0	100	0	100	0			100	0
	Roaming FW	100	0	100	0	100	0			100	0

Table 5- Mobile network equipment allocation rules according to the type of coefficient (a,b) of the environmental model

- **Network hosting site equipment**

Technology	Equipment family	Manufacture		Distribution		Installation		Use		End of life	
		Type a	Type b	Type a	Type b	Type a	Type b	Type a	Type b	Type a	Type b
Network hosting site											
FIXED & MOBILE	Network hosting site	0	100	0	100	0	100	0	100	0	100

Table 6- Rules for allocating network hosting sites according to the type of coefficient (a,b) of the environmental model

At the end of step 1, each operator will have individual tables taking into account the distribution of elements according to the ax+b model.

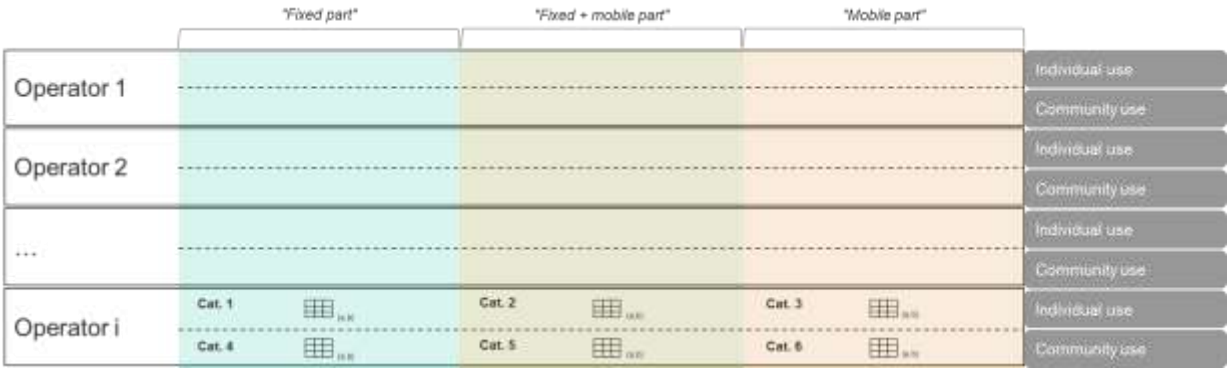


Table 7- Intermediate results table for operator i after step 1

4.4.4. Step 2: Phase of exchange of intermediate results between operators

For the application of the allocation rules in step 3, operators will need to exchange the environmental impacts related to "**multi-operator** use". As such, each operator will have to provide the following information to the other operators: GWP impact for categories 4, 5 and 6 symbolised by:

The level of data exchange is summarised in the following diagram:

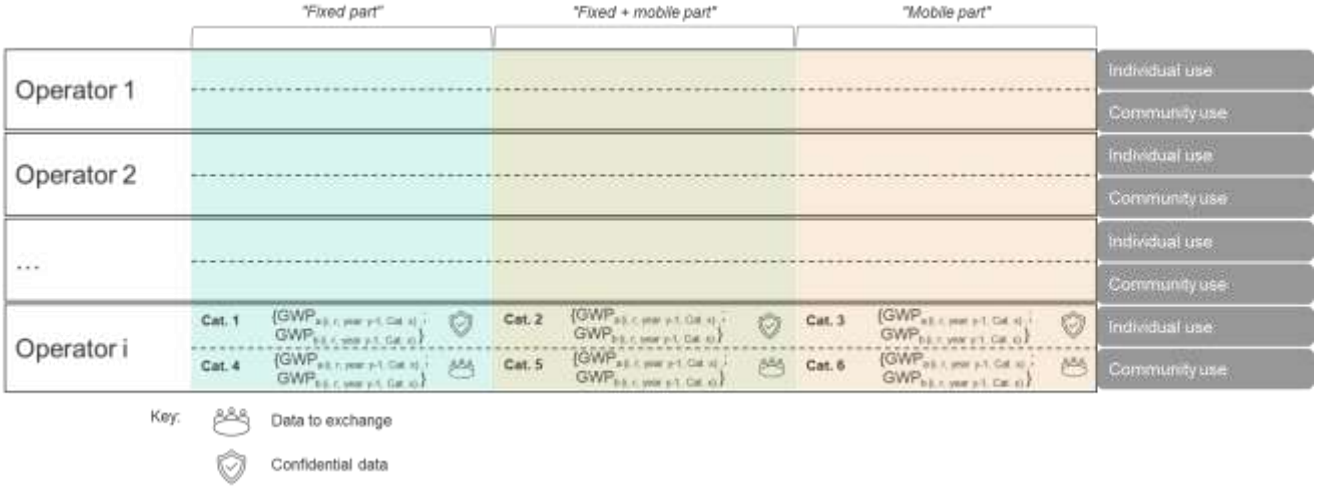


Figure 13- Intermediate results data to be exchanged by operator i during step 2

The environmental impacts of categories 4, 5 and 6 will be added together to give the total impact of **multi-operator** uses across all operators.

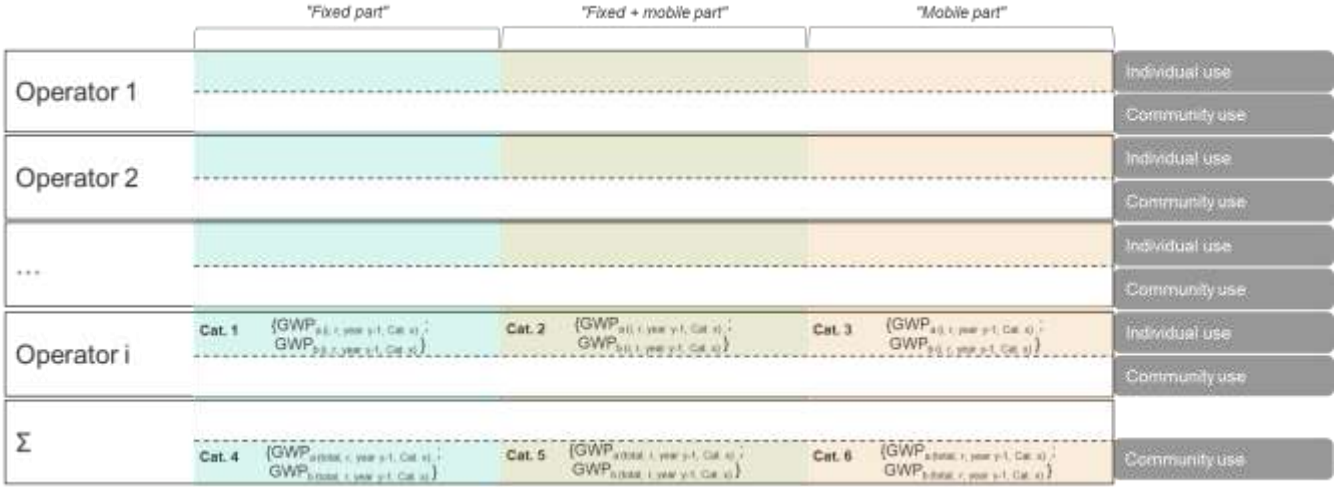


Figure 14- Intermediate results data of operator i at the end of step 2

4.4.5. Step 3: Allocation rule for shared equipment

The environmental impacts of shared equipment will be individualised for each operator, taking into account the following allocation rules:

Category	Type of data	Type of allocation	Scope
Cat.2	GWP_a	Volume of data exchanged[2]	on the **fixed and mobile network** of the **operator in question** over the assessment period
	GWP_b	Number of subscribers[3]	
Cat.4	GWP_a	Volume of data exchanged[2]	on the **fixed network** by **all operators** over the assessment period
	GWP_b	Number of subscribers[3]	
Cat.5	GWP_a	Volume of data exchanged[2]	on the **fixed and mobile network** by **all operators** over the assessment period
	GWP_b	Number of subscribers[3]	
Cat.6	GWP_a	Volume of data exchanged[2]	on the **mobile network** by **all operators** over the assessment period
	GWP_b	Number of subscribers[3]	

Table 8- Allocation rules for shared equipment in the environmental model

As such, at the end of step 3, each operator will have a carbon quantification for the use of the fixed network (known as the "allocated fixed network") and the mobile network (known as the "allocated mobile network"). For further clarification on the case of shared equipment, an example has been added in annex A.

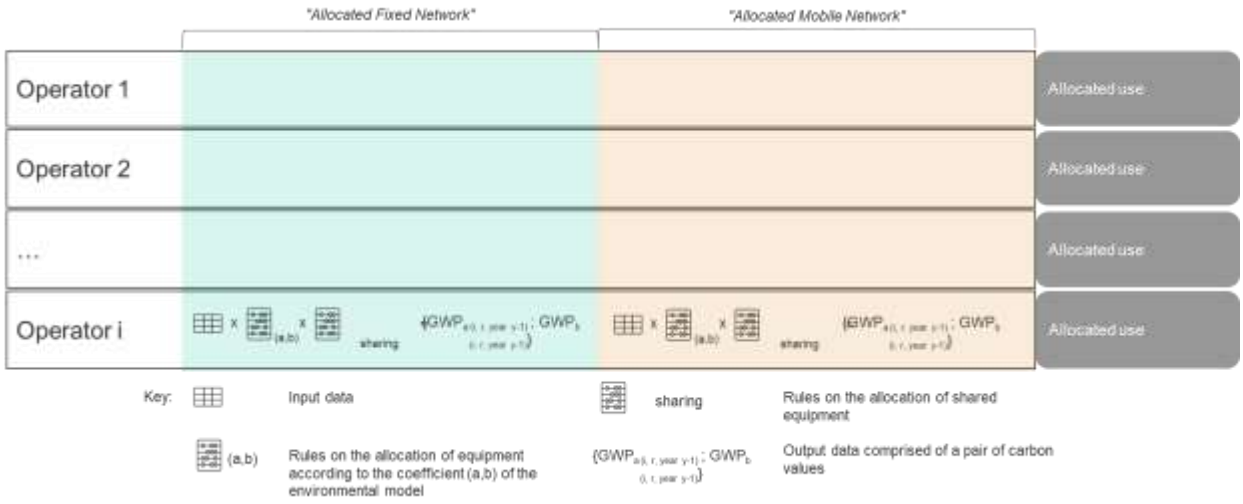


Figure 15- Intermediate results data of operator i at the end of step 3

Special case of shared equipment:

Co-located equipment is, for example, equipment of operator A installed at an operator B.

The manufacture/installation/maintenance/end of life steps are managed by operator A. These phases are to be considered as a single operator impact. The use stage is at operator B, except that operator B does not necessarily have a dedicated electricity meter for the co-located equipment. In this case, the impact of the use phase can be calculated based on consumption estimates made by operator A.

[2] Volume of data exchanged on the technology(ies) concerned by the sharing
[3] Number of subscribers on the technology(ies) concerned by the sharing

4.5. Step 4: Allocation rule for calculating the functional unit

At the end of step 3, each operator has a carbon quantification for the use of the fixed network (known as the "Allocated Fixed Network") and the mobile network (known as the "Allocated Mobile Network") calculated over the assessment period (year y-1) with a pair of values $\{GWP_{a\,(i,\,r,\,year\,y-1)};\ GWP_{b\,(i,\,r,\,year\,y-1)}\}$, stated in tonnes of CO_2 eq.

To express the impacts of its network at one subscriber according to its data consumption (functional unit), the following allocation rules shall apply:

- **Time allocation**: the carbon impact calculated over the assessment period will be allocated on a monthly basis over the 12 months of the communication period (allocation factor = 1/12).
- **Allocation by data volume**: the "type a" monthly carbon impact will be divided by the amount of data exchanged during the previous month (month m of year y-1), then multiplied by the amount of data consumed by the subscriber in question during the month (month m). Note that there are different methods for assessing the amount of data consumed by a subscriber (see annex for details of the methods, and in particular the recommended method).
- **Allocation to the number of subscribers**: the "type b" monthly carbon impact will be divided by the number of subscribers of operator i during the previous month (month m of year y-1).

4.6. Final communication

See article 13.III and associated decrees.

4.7. Control points

This section covers recommendations and/or verification requirements to ensure the unbiased application of the allocation rules. The aim is to avoid double counting of impacts or missing impacts.

Each operator should at least document the following elements in case of a control operation:

- The number of subscribers over the assessment period on the fixed and mobile networks
- Total amount of data exchanged over the assessment period on the fixed and mobile networks
- The number of equipment items purchased by the operator during year y-1
- The distribution of shared equipment between operators
- The various calculations performed to obtain the sum of a and b

4.8. Details of the formulas

Rating:

- i = Telecoms operator i.
  Example: i = Operator 1
- r = Network type.
  Example: r = Mobile Network
- Cat. x = Network category
  *Example: Cat. x = Cat. 3 corresponding to category no. 3 relating to the "fixed + mobile part" for a "**single-operator** use"*
- year y-1 = assessment year
  Example: year y-1 = 2022 (1 Jan 22 to 31 Dec 22)
- year y + 6 months = communication year
  Example: year y-1 = 2023 (1 Jul 23 to 31 Jun 24)
- c = Customer **c**.
  Example: c = Dubois
- m = Month of communication of the invoice of customer **c**.
  Example: for an invoice issued on 15 Sep 23 relating to data consumption from 15 Aug 23 to 14 Sep 23, m = Sep 23
- Subscribers $_{(i, r, year\ y-1)}$ = Number of subscribers of operator **i** on network **r** during year **y-1**.
  Example: Subscribers $_{(Operator\ 1,\ Mobile\ Network,\ 2022)}$ = 19,800,000 subscribers
- Subscribers $_{(i, r, m-1)}$ = Number of subscribers of operator **i** on network **r** during month **m-1**.
  Example: Subscribers $_{(Operator\ 1,\ Mobile\ Network,\ Aug\ 23)}$ = 20,599,920 subscribers
- Data $_{(i, r, year\ y-1)}$ = Total amount of data exchanged by subscribers of operator **i** on network **r** during year **y-1** (value stated in TB)
  Example: Data $_{(Operator\ 1,\ Mobile\ Network,\ 2022)}$ = 59,400 TB
- Data $_{(i, r, m-1)}$ = = Total amount of data exchanged by the subscribers of operator **i** on network **r** during month **m-1** (value stated in TB)
  Example: Data $_{(Operator\ 1,\ Mobile\ Network,\ Aug\ 23)}$ = 61,800 TB
- Data $_{(i, r, c, m)}$ = Amount of data consumed by customer **c** for month **m** on network **r** of operator **i** (value stated in GB).
  Example: Data $_{(Operator\ 1,\ Mobile\ Network,\ Dubois,\ Sep\ 23)}$ = 15.6 GB
- GWP $_{(i, r, year\ n-1)}$ = Annual carbon impact of the assessment **year y-1** associated with operator **i** for the operation of network **r** (value stated in tonnes of CO_2 eq.)
  Example: GWP $_{(Operator\ 1,\ Mobile\ Network,\ 2023)}$ = 57,859 tonnes of CO_2 eq

- $GWP_{(i, r, c, m)}$ = Carbon impact associated with the telecoms bill of customer **c** of month **m** for its amount of data consumed **Data $_{(c,m)}$** on network **r** of operator **i** (value stated in g of CO_2 eq.)
  Example: $GWP_{(Operator\ 1,\ Mobile\ Network,\ Dubois,\ Sep\ 23)} = 649\ g\ CO_2\ eq$
- $GWP_{a\ (i, r, year\ y\text{-}1)}$ = Type a annual carbon impact associated with operator **i** for the operation of network **r** in assessment **year y-1** (value stated in tonnes of CO_2 eq.)
- $GWP_{b\ (i, r, year\ y\text{-}1)}$ = Type b annual carbon impact associated with operator **i** for the operation of network **r** in assessment **year y-1** (value stated in tonnes of CO_2 eq.)
- $GWP_{a\ (i, r, year\ y\text{-}1, Cat.\ x)}$ = Intermediate result of **type a** at the end of step 2 associated with operator **i** for network **r** for category **Cat. x** in assessment **year y-1** (value stated in tonnes of CO_2 eq.)
- $GWP_{b\ (i, r, year\ y\text{-}1, Cat.\ x)}$ = **Type b** intermediate result at the end of step 2 associated with operator **i** for network **r** for category **Cat. x** (value stated in tonnes of CO_2 eq.)
- $GWP_{a\ (i, r, year\ y\text{-}1, element\ n, life\ cycle, Cat.\ x)}$ = **Type a** intermediate data at the end of step 1 associated with the life cycle stage of element **n** managed by operator **i** for network **r** for category **Cat. x** (value stated in tonnes of CO_2 eq.)
- $GWP_{b\ (i, r, year\ y\text{-}1, element\ n, life\ cycle, Cat.\ x)}$ = **Type a** intermediate data at the end of step 1 associated with the life cycle stage of element **n** managed by operator **i** for network **r** for category **Cat. x** (value stated in tonnes of CO_2 eq.)
- $GWP_{(i, r, year\ y\text{-}1, element\ n, life\ cycle, Cat.\ x)}$ = Step 1 input data associated with the life cycle stage of element **n** managed by operator **i** for network **r** for category **Cat. x** (value stated in tonnes of CO_2 eq.)
- $A_{(i, r, m)}$ = **Type a** carbon index associated with operator **i** for the operation of network **r** for communication month **m** (value stated in g CO_2 eq. per GB)
- $B_{(i, r, m)}$ = **Type b** carbon index associated with operator **i** for the operation of network **r** for communication month **m** (value stated in g CO_2 eq.)

Formulas:

$$GWP_{a\ (i, r, year\ y\text{-}1)} = \sum_{x=1}^{6} GWP_{a\ (i, r, year\ y\text{-}1, Cat.\ X)} \times \text{"Allocation rules for shared elements"}$$

$$GWP_{b\ (i, r, year\ y\text{-}1)} = \sum_{x=1}^{6} GWP_{b\ (i, r, year\ y\text{-}1, Cat.\ X)} \times \text{"Allocation rules for shared elements"}$$

Where:

"Allocation rules for shared elements": rules defined in section 4.4.5

Where r = fixed network, categories Cat.3 and Cat.6 do not apply.

Where r = mobile network, categories Cat.1 and Cat.4 do not apply.

$$GWP_{(i, r, year\ y\text{-}1)} = GWP_{a\ (i, r, year\ y\text{-}1)} + GWP_{b\ (i, r, year\ y\text{-}1)}$$

Example:

$GWP_{(Operator\ 1,\ Mobile\ Network,\ 2022)}$ = $GWP_{a\ (Operator\ 1,\ Mobile\ Network,\ 2022)}$ + $GWP_{b\ (Operator\ 1,\ Mobile\ Network,\ 2022)}$

= 31,220 tonnes of CO_2 eq. + 26,640 tonnes of CO_2 eq.

= 57,859 tonnes of CO_2 eq.

$$GWP_{(i, r, c, m)} = A_{(i, r, m)} \times Data_{(i, r, c, m)} + B_{(i, r, m)}$$

Where:

$$A_{(i, r, m)} = GWP_{a\,(i, r, year\ y-1)} \times (1/12) \times (1/Data_{(i, r, m-1)})$$

$$B_{(i, r, m)} = GWP_{b\,(i, r, year\ y-1)} \times (1/12) \times (1/Subscribers_{(i, r, m-1)})$$

Example:

$A_{(Operator\ 1, Mobile\ Network, Sep\ 23)} = GWP_{a\,(Operator\ 1, Mobile\ Network, 2022)} \times (1/12) \times (1/Data_{(Operator\ i, Mobile\ Network, Aug\ 23)})$

$= 31{,}220$ tonnes of CO_2 eq. $\times (1/12) \times (1/59{,}400$ TB)

= … tonnes of CO_2 eq. / TB

$= 4.44^{E+01}$ g of CO_2 eq. / GB

$B_{(Operator\ 1, Mobile\ Network, Sep\ 23)} = GWP_{b\,(Operator\ 1, Mobile\ Network, 2022)} \times (1/12) \times (1/Subscribers_{(Operator\ i, Mobile\ Network, Aug\ 23)})$

$= 26{,}640$ tonnes of CO_2 eq. $\times (1/12) \times (1/20{,}599{,}920$ Subscribers)

= … tonnes of CO_2 eq.

$= 7.00^{E-02}$ g of CO_2 eq.

$GWP_{(Operator\ 1, Mobile\ Network, Dubois, Sep\ 23)} = A_{(Operator\ 1, Mobile\ Network, Sep\ 23)} \times Data_{(Operator\ 1, Mobile\ Network, Dubois, Sep\ 23)} + B_{(Operator\ 1, Mobile\ Network, Sep\ 23)}$

$= 4.44^{E+01}$ g of CO_2 eq. / GB x 15.6 GB + 7.00^{E-02} g CO_2 eq.

= 693 g CO_2 eq.

5. Connection between data

This section provides information on the different types of data to be collected and modelled, as well as the collection and quality criteria to follow. Lastly, it lists the primary, secondary and semi-specific data needed to model the digital service, based on the control of the declarers on each data item to be collected.

Primary activity data (or specific data) is a quantified value derived from a direct measurement or a calculation from direct measurements of an activity or process in the product life cycle. After multiplication by an emission or characterisation factor, this value can be used to calculate an impact category indicator.

Each declarer must detail the primary data used, as well as the associated quality level in the report.

Secondary data (or generic data) is a quantified value of a product life cycle activity or process obtained from sources other than direct measurement or calculation from direct measurements.

Semi-specific data is primary (or specific) data to be entered by the operator for which a default value is proposed. These semi-specific values, which are deliberately conservative, are intended to encourage stakeholders in the sector to substitute their own values in order to improve the results of the environmental assessment. The conservative values proposed are not average values and must be used strictly within the context of this methodological standard.

5.1. Primary data collection method

The approach used in this PCR and its application for art. 13.III of the AGEC law is the actual approach: the capacity factor is determined based on the collection of data carried out. It must be indicated.
This actual approach is mandatory.

Furthermore, as part of this PCR and its application for art. 13.III of the AGEC law, the data are to be collected over a period of one year (see 4.3), with the exception of the consumer's digital data consumption data, which is to be collected over a monthly period, corresponding to the frequency of communication of the impacts.
As explained in the steps for the application of the allocation rules (part 4.), data collection should be carried out according to the scope controlled by the internet service provider:

Scope	IT/non-IT equipment operated by the internet service provider	IT/non-IT equipment not operated by the internet service provider
Data to collect	- The assessment of the impacts related to the manufacture of equipment purchased by ISPs will have to be based either on public environmental declarations by equipment manufacturers or on environmental declarations that equipment manufacturers will have to provide directly to operators. These declarations must comply with the quality criteria set out in the annex. - The impacts related to the other phases of the life cycle of the equipment should be assessed by the operator according to the methodology detailed in section 4.	The results of the assessment of the impacts linked to this equipment should be provided by the ISPs operating this part of the network as explained in section 4.

5.2. Completeness and connection between primary, secondary and semi-specific data

It is difficult to apply the principle of mass, energy or impact cut-off rules in the case of digital services. The preferred approach here is therefore that of the representativeness (completeness) of the equipment or systems, depending on the approach chosen.

As part of this PCR, *the measurement and modelling of the digital service should cover a defined percentage (greater than or equal to 95%) of the equipment or systems, in terms of the energy consumption of the modelled elements in relation to the energy consumption of all elements associated with the digital service concerned, for each tier (devices, network, data centre).*

The following table lists the primary, semi-specific and secondary data to be used:

ACCESS equipment				
Network	Technology	Block diagram element	Type of data	Climate change impact (kg CO_2 eq)
FIXED	Common	Collection router/switch on OCN[4] and/or SCN[5] Optical fibre Copper cable	Primary	-
	xDSL	IAD[6]/CPE[7] unit (ADSL modem with integrated Wi-Fi router) DSLAM[8]	Primary	-
	FTTH Fibre	IAD/CPE unit without ONT[9]/SFP[10] (Wi-Fi router)	Primary	-
		ONT (external)	Primary	-
		IAD unit with integrated ONT/SFP (Wi-Fi router with integrated ONT or SFP)	Primary	-
		OLT[11]	Primary	-
	FTTLA Fibre	IAD unit/CPE cable (Wi-Fi router with integrated DOCSIS modem)	Primary	-
MOBILE	Common	Multi-band passive antenna (1.4 m to 2.7 m)	Semi-specific	5.53E+01
		RU amplifier (700, 800, 900, 1,800, 2,100, 2,600 MHz)	Secondary	Out of scope for this version
		RRU[12]/RRH[13] amplifier (700, 800, 900, 1,800, 2,100, 2,600 MHz)	Primary	-
	2G (GSM)	BTS[14] - 2G BBU[15]	Semi-specific	4.90E+01
	3G (UMTS)	NODEB - 3G BBU		
	4G (LTE)	ENODEB - 4G BBU		
	5G (NR)	GNODEB - 5G BBU		
		AAS - 3.5 GHz Active Antenna	Primary	-
	Transport	Radio site collection router	Semi-specific	6.68E+01
		Microwave - ODU[16] - Passive antenna	Secondary	Out of scope for this version

[4] Optical connection node
[5] Subscriber connection nodes
[6] Integrated Access Device
[7] Customer Premise Equipment
[8] Digital Subscriber Line Access Multiplexer
[9] Optical Network Termination
[10] Small Form-factor-Pluggable
[11] Optical Line Termination
[12] Remote Radio Unit
[13] Remote Radio Head
[14] Base Transceiver Station
[15] Baseband Unit
[16] Outdoor Unit

		Microwave - ODU - RF[17]r amplifier	Secondary	Out of scope for this version
		Microwave - IDU[18]	Secondary	Out of scope for this version

Table 9 - Connection of primary, semi-specific and secondary data for Access equipment

AGGREGATION equipment				
Network	Technology	Block diagram element	Type of data	Climate change impact (kg CO_2 eq)
FIXED	All types	Aggregation router	Secondary	5.85E+02
		Aggregation loop WDM[19] equipment		2.67E+03
MOBILE	All types	Aggregation router		5.85E+02
		Aggregation loop WDM[20] equipment		2.67E+03
		4G/5G security gateway		1.16E+02

Table 10 - Connection of secondary data for Aggregation equipment

BACKBONE equipment				
Network	Technology	Block diagram element	Type of data	Climate change impact (kg CO_2 eq)
FIXED	All types	WDM backbone equipment	Secondary	2.67E+03
		P-PE-Peering Router		2.01E+03
		Fixed DNS		Out of scope for this version
MOBILE		WDM backbone equipment		2.67E+03
		P-PE-Peering Router		2.01E+03
		MME[21]/SGSN[22]		1.51E+03
		HSS[23]/HLR[24]		2.38 E+03[25]
		SP-GW[26]/GGSN[27]		3.94E+02
		PCRF[28]		2.38 E+03[29]
		Gi[30] LAN[31]		5.85E+02[32]
		Mobile/Roaming DNS[33]		Out of scope for this version

[17] Radio Frequency
[18] Indoor Unit
[19] Wavelength Division Multiplexing
[20] Wavelength Division Multiplexing
[21] Mobility Management Entity
[22] Serving GPRS support node
[23] Home Subscriber Server
[24] Home Location Register
[25] The assumption made for this first modelling is to consider the impact of manufacturing this equipment as the equivalent of a virtualised equipment item sized for 1 to 2 million users (modelled by 8 instances of characteristics: 40 Threads (vCPU), 64 GB (RAM))
[26] Serving/PDN-Gateway
[27] Gateway GPRS Support Node
[28] Policy and Charging Rules Function
[29] The assumption made for this first modelling is to consider the impact of manufacturing this equipment as the equivalent of a virtualised equipment item sized for 1 to 2 million users (modelled by 8 instances of characteristics: 40 Threads (vCPU), 64 GB (RAM))
[30] Gateway-Internet
[31] Local Area Network
[32] The assumption made for this first modelling is to consider the impact of manufacturing this equipment dedicated to traffic management as equivalent to that of an aggregation router
[33] Domain Name System

		Roaming FW[34]		6.68E+01[35]

Table 11 - Connection of secondary data for backbone equipment

AGGREGATION AND BACKBONE OPTICAL FIBRES				
Network	Technology	Block diagram element	Type of data	Climate change impact (kg CO_2 eq)
FIXED & MOBILE	Common	2-strand optical fibre (1 linear metre)	Secondary	5.93E-02
		12-strand optical fibre (1 linear metre)		7.01E-02
		24-strand optical fibre (1 linear metre)		8.29E-02
		48-strand optical fibre (1 linear metre)		1.09E-01
		72-strand optical fibre (1 linear metre)		1.34E-01
		96-strand optical fibre (1 linear metre)		1.60E-01
		144-strand optical fibre (1 linear metre)		2.12E-01
		288-strand optical fibre (1 linear metre)		3.66E-01
		576-strand optical fibre (1 linear metre)		6.76E-01
		720-strand optical fibre (1 linear metre)		8.31E-01

Table 12 - Connection of secondary data for optical fibres

[34] Firewall

[35] The assumption made for this first modelling is that the impact of manufacturing this equipment is equivalent to that of an on-site radio collection router

For the connection of the semi-specific data between the hosting sites (tables below), in the absence of information take into account the indications in **annex G**:

Small fixed network hosting site			
Network	Technology	Block diagram element	Type of data
FIXED	Urbanisation	Building architecture (m3 concrete and kg steel)	Semi-specific

Table 13 - Connection of semi-specific data for small fixed network hosting sites

Medium fixed network hosting site			
Network	Technology	Block diagram element	Type of data
FIXED	Urbanisation	Building architecture (m3 concrete and kg steel)	Semi-specific
	High current and distribution	Transformer (unit), LVS (unit) and HQAP (unit)	
	48V workshop	Rectifier (unit)	
	Air conditioning	Air conditioner (unit) and air handling unit (unit)	
	Backup power	Generator (unit), filled fuel oil tank (unit)	

Table 14 - Connection of semi-specific data for medium fixed network hosting sites

Large fixed network hosting site			
Network	Technology	Block diagram element	Type of data
FIXED	Urbanisation	Building architecture (m3 concrete and kg steel)	Semi-specific
	High current and distribution	Transformer (unit), LVS (unit) and HQAP (unit)	
	48V workshop	Rectifier (unit)	
	Air conditioning	Air conditioner (unit) and air handling unit (unit)	
	Cabling	Copper (linear metre)	
		Optical fibre (linear metre)	
	Backup power	Generator (unit), filled fuel oil tank (unit)	
	Electrical safety	Inverters (unit) and batteries (unit)	

Table 15 - Connection of semi-specific data for medium fixed network hosting sites

Mobile network hosting site - OCN			
Network	Technology	Block diagram element	Type of data
MOBILE	Urbanisation	Building architecture (m3 concrete and kg steel) including slabs and shelter	Semi-specific
	High current and distribution	LVS transformer (unit)	
	Air conditioning	Air conditioner (unit)	

Table 16 - Connection of semi-specific data for mobile network hosting sites

Mobile network hosting site - Terrace and Pylon			
Network	Technology	Block diagram element	Type of data
MOBILE	Urbanisation	Building architecture (m3 concrete and kg steel)	Semi-specific

Table 17 - Connection of semi-specific data for mobile network hosting sites – Terrace and Pylon

6. Specificity

6.1. Electricity consumption

For all life cycle stages, the electricity consumption should be representative of the geographical area corresponding to the stage.

The data for the electrical models is contained in the Impacts® database.

For the case of carbon offsetting and green certificates, as well as energy self-consumption, please see the "Methodological framework for the environmental assessment of digital services" PCR.

6.2. Transport

Transport-specific data should be taken into account for the transport stages (kilometres travelled, mode of transport) that correspond to the average distribution scenario in France.
If no specific data is available, the following default data is used for all stages, from manufacture to end of life:

- International transport: 19,000 km by boat + 1,000 km by truck
- Intracontinental transport: 3,500 km by truck
- Local/national transport: 1,000 km by truck

By default, a 27-tonne semi-trailer is used with a load factor of 85%. The type of vessel to take into account is a 27,500-tonne container ship.

If special means of transport or empty returns are necessary, then these must be taken into account.

6.3. Installation and Maintenance

Particular attention is paid to the installation and maintenance of certain equipment (notably the installation/uninstallation of units, fibre optics, etc.), as this can generate potentially significant additional environmental impacts. On the basis of specific data, all installation and maintenance operations should be taken into account, including:

- The manufacture of equipment and spare parts required for operations,

- The transport of professionals and equipment needed for operations: an overall transport distance (in km) of professionals carrying out installation and maintenance operations can be taken into account, specifying the means of transport (e.g. a utility vehicle). *In the absence of further information, the value used will be 220 g of CO_2 eq/km.*

- The end-of-life treatment of any waste (spare parts, scraps and other consumables) produced during operations,

7. Environmental indicators

7.1. Data leading to environmental impacts

See the "Methodological standard for the environmental assessment of digital services" PCR: no changes.

7.2. Environmental indicators selected

See the "Methodological standard for the environmental assessment of digital services" PCR: no changes.

7.3. Relevant environmental indicators

See the "Methodological standard for the environmental assessment of digital services" PCR: no changes.

8. Temporary data validation and update frequency

See the "Methodological standard for the environmental assessment of digital services" PCR: no changes.

9. Validation method for data and results

The envisaged validation of the data and results of the environmental communication is as follows.

Manufacturers keep one file per product reference containing primary (or specific) data. Validation consists of:

- ensuring the reproducibility of indicator calculations based on the content of the file;
- searching for evidence of the information contained in the file, on a sampling basis.

Information on the development of the communication must be universally accessible, in a transparent and free manner under appropriate conditions (report, website, etc.). This information includes assumptions, data acquisition methods, the connection between primary (or specific) and secondary (or generic) data, characterisation factors and the limitations of the assessment.

There is no obligation to provide the consumer with the data needed to calculate the impact indicators. However, this data must be kept for the market surveillance authorities by specifying and retaining (within the confidentiality limits of its processes):

- primary (or specific) data;
- secondary (or generic) data sources;
- the default values selected.

Under the AGEC law, there is no provision for a control of declarations in principle. However, the environmental claims that can be made under this law may be subject to further controls by the DGCCRF.

10. Method for taking into account the time lag in GHG (greenhouse gas) emissions

See the "Methodological standard for the environmental assessment of digital services" PCR: no changes.

11. Limits

A number of limitations – in addition to those identified in the "Methodological standard for the environmental assessment of digital services" PCR – have been identified in the drafting of these sectoral rules, depending in particular on the current limitations in terms of data accessibility.

11.1. Consideration of points of sale

Several factors led to the decision to exclude points of sale: difficulty in calculating the impacts of points of sale, the nature of which is very different from digital services, and difficulty in determining the allocation rule.

11.2. Non-consideration of the support activities usage phase

The support activities of the operators (notably stores, R&D, administration, etc.) are not taken into account due to the difficulty of collecting and linking the data to the functional unit.

11.3. Limitations of the environmental model

The accurate and comprehensive determination of the environmental impacts of digital equipment and infrastructure in France is a complex task that faces many limitations due to data access and associated uncertainties. This section addresses the known limitations of the environmental model and points for improvement to be considered when updating the ISP standard. In particular, the following have been identified to date:

Concept of the different distributions

- The concept of the different distributions defined in this document is mainly based on qualitative feedback from operators and professionals in the sector (choice of an ax+b type model and definition of the a and b coefficients for all equipment). The fixed component depending on the number of users on the network is an uncertainty and the allocation rules defined based on operator feedback are to be taken into account when performing the calculations. Developments may take place, particularly in the use phase, where the data currently focuses on all network data accessible by operators.

Developments in network equipment

- Some networks could not be included due to a lack of knowledge of the technologies used (this is the case with networks using satellite technologies)
- Some equipment could not be included due to a lack of data and constant developments in the network architecture (e.g. CMTS, satellite, etc.)

Data collection

- The primary data collected on the number of equipment items, their lifetimes and their electricity consumption are subject to uncertainty. This limitation may lead to an under- or overestimation of the results.
- Semi-specific and secondary data are by definition an approximation of the impact of an equipment item. The configuration used to establish these defaults may not correspond exactly to that of the operator's equipment. This limitation may lead to an under- or overestimation of the results.

Development in the maintenance scenario

- During the use phase, some equipment requires maintenance (change of components, cleaning, etc.) and some may be upgraded. The estimation of the environmental impacts related to this maintenance or upgrading was mostly excluded from the methodology. This limitation may lead to an underestimation of the results. This is an important area of improvement for future studies and should be strengthened.

12. Annexes

12.1. Annex A – Application of allocation factors to shared equipment

The purpose of this annex is to illustrate the application of the allocation factors (Steps 1 to 4) to a shared equipment item. The shared equipment studied in this example is a 4G BBU shared between two operators. The 4G BBU equipment belongs to Category 6 "Network element managed by an operator i used for the operation of the mobile network for multi-operator use". The assessment period (year y-1) is 2022. The communication period is 2023. Other mobile network equipment is not covered in this example for clarity reasons (note: a raster data presentation would be required). The principles discussed in this example apply to all equipment in fixed and/or mobile networks. The values used in this example are fictitious and should be considered as such.

Example:
In 2022, operator 1 installed several 4G BBUs on its mobile network. It shares its equipment with operator 2.
Operator 2 does not have any 4G BBUs on its own network. It is entirely dependent on operator 1 for this type of equipment.

Input data:
The individual tables of input data for operators 1 and 2 are as follows:

- Based on manufacturer data, the operator was able to calculate the carbon impact of the 4G BBUs. The operator declares 4,446 tonnes of CO_2 eq. for 2022, broken down as follows.

- Since it does not have any 4G BBUs, operator 2 does not report any direct emissions.

Step 1:
According to section 4.4.3, the allocation factors [a;b] defined for 4G BBUs are [100;0] for the use phase and [60;40] for the other life cycle phases.

Applying the allocation factors [60;40], we obtain for the manufacturing step:

$GWP_{a\ (1,\ mobile\ network,\ 2022,\ 4G\ BBU,\ manufacture,\ Cat.\ 6)}$ = 60% x $GWP_{(1,\ mobile\ network,\ 2022,\ 4G\ BBU,\ life\ cycle,\ Cat.\ 6)}$
= 60% x 780 t CO_2 eq.
= 468 t CO_2 eq.

$GWP_{b\ (1,\ mobile\ network,\ 2022,\ 4G\ BBU,\ manufacture,\ Cat.\ 6)}$ = 40% x $GWP_{(1,\ mobile\ network,\ 2022,\ 4G\ BBU,\ life\ cycle,\ Cat.\ 6)}$
= 40% x 780 t CO_2 eq.

= 312 t CO_2 eq.

We do the same for the other stages of the life cycle. We then obtain for operators 1 and 2:

Where:

$\{GWP_{a\ (1,\ mobile\ network,\ 2022,\ Cat.\ 6)}\ ;\ GWP_{b\ (1,\ mobile\ network,\ 2022,\ Cat.\ 6)}\}$

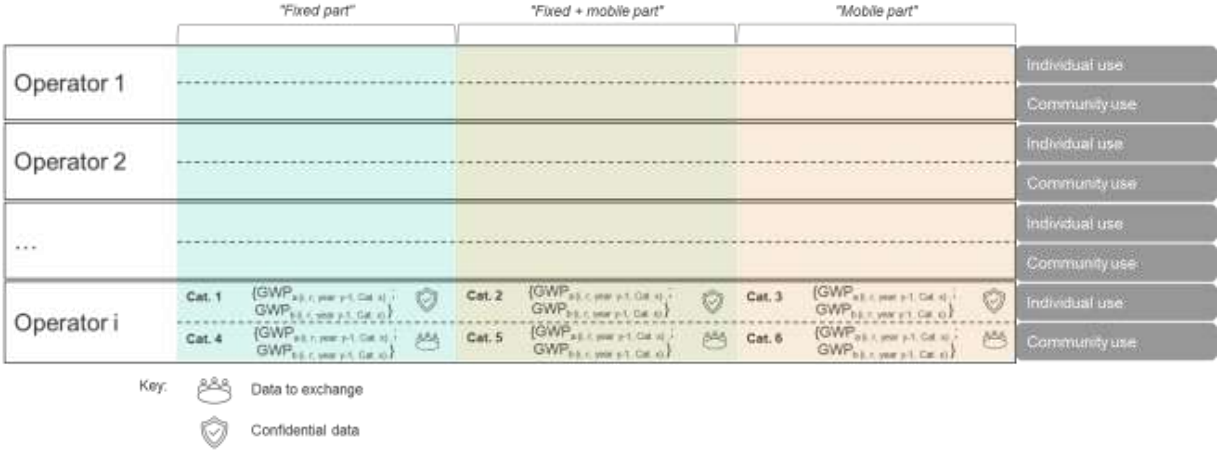
$= \{468 + 93{,}6 + 140{,}4 + 3{,}120 + 93.6;\ 312 + 62.4 + 93.6 + 0 + 62.4\}$

$= \{3{,}915.6;\ 530.4\}$ values stated in t CO_2 eq.

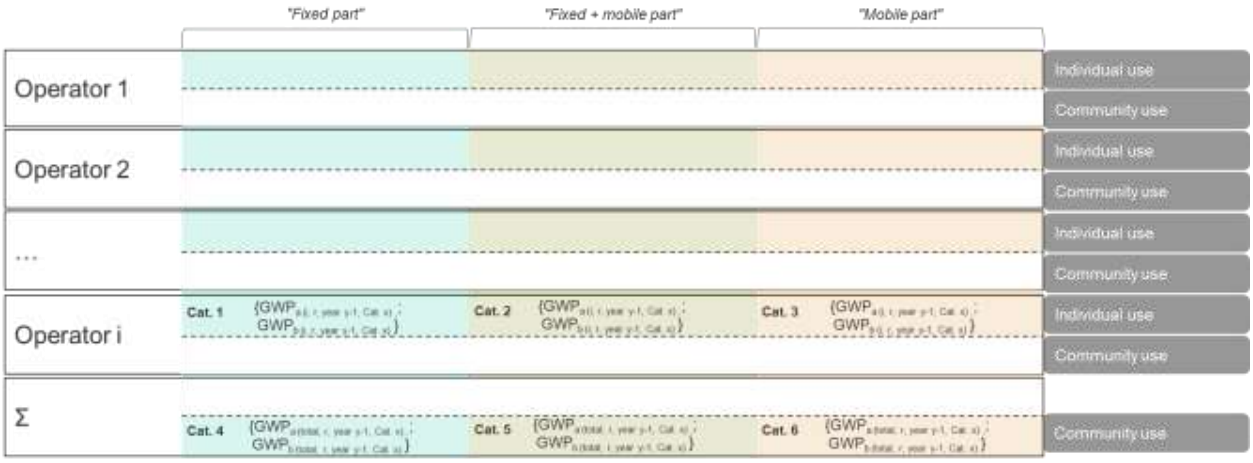
Step 2:

For the application of the allocation rules in step 3, operators 1 and 2 exchange their environmental impacts related to "**multi-operator** use". In the example, these are the values:

- $\{GWP_{a\ (1,\ mobile\ network,\ 2022,\ Cat.\ 6)}\ ;\ GWP_{b\ (1,\ mobile\ network,\ 2022,\ Cat.\ 6)}\} = \{3{,}915.6;\ 530{,}4\}$ values stated in t CO_2 eq.
- $\{GWP_{a\ (2,\ mobile\ network,\ 2022,\ Cat.\ 6)}\ ;\ GWP_{b\ (2,\ mobile\ network,\ 2022,\ Cat.\ 6)}\} = \{0;\ 0\}$ values stated in t CO_2 eq.



The environmental impacts of category 6 are added together to give the total impact of **multi-operator** use across all operators (in this case, operators 1 and 2).



This gives us:

{$GWP_{a\ (total,\ mobile\ network,\ 2022,\ Cat.\ 6)}$; $GWP_{b\ (total,\ mobile\ network,\ 2022,\ Cat.\ 6)}$}
= {3,915.6; 530.4} values stated in t CO_2 eq.

Step 3:

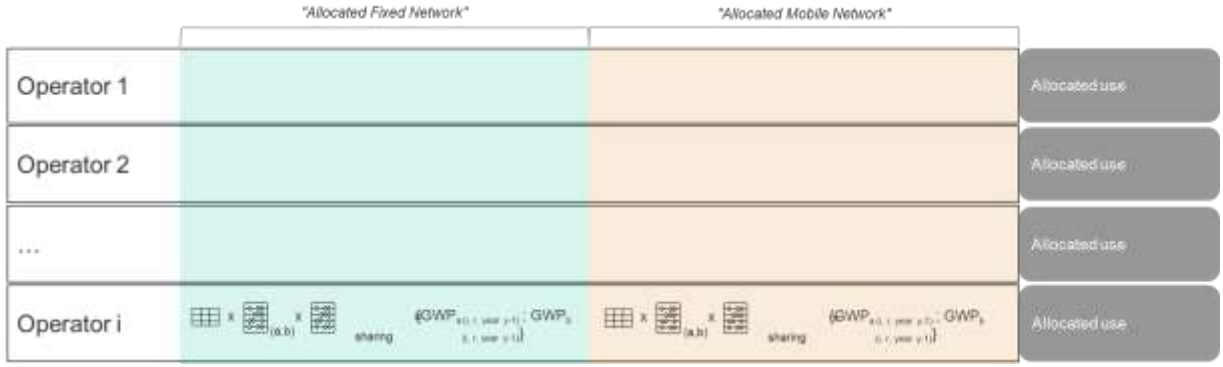
The environmental impacts of category 6 shared equipment are individualised for each operator taking into account the following allocation rules:

Category	Type of data	Type of allocation	Scope
Cat.6	GWP_a	Volume of data exchanged[2]	on the **mobile network** by **all operators** over the assessment period
	GWP_b	Number of subscribers[3]	

In our example, we have the following input data:

	Operator 1	Operator 2	Total
Volume of data exchanged on the **mobile network** for the 2022 assessment period (in TB)	66,000	64,800	130,800
	50.46%	49.54%	100.0%
Number of subscribers on the **mobile network** for the assessment period 2022	13,200,000	8,100,000	21,300,000
	61.97%	38.03%	100.0%

Applying the allocation factors produces the following results:



Where:

{$GWP_{a\ (1,\ mobile\ network,\ 2022)}$; $GWP_{b\ (1,\ mobile\ network,\ 2022)}$}
= {50.46% x $GWP_{a\ (total,\ mobile\ network,\ 2022,\ Cat.\ 6)}$; 61.97% x $GWP_{b\ (total,\ mobile\ network,\ 2022,\ Cat.\ 6)}$}
= {50.46% x 3,915.6; 61.97% x 530.4}
= {1,975.8; 328.7} values stated in t CO_2 eq.

{$GWP_{a\ (2,\ mobile\ network,\ 2022)}$; $GWP_{b\ (2,\ mobile\ network,\ 2022)}$}
= {49.54% x $GWP_{a\ (total,\ mobile\ network,\ 2022,\ Cat.\ 6)}$; 38.03% x $GWP_{b\ (total,\ mobile\ network,\ 2022,\ Cat.\ 6)}$}
= {49.54% x 3,915.6; 38.03% x 530.4}
= {1,939.8; 201.7} values stated in t CO_2 eq.

What to remember:

The input data was: "Operator 1 reports 4,446 tonnes of CO_2 eq. in 2022. Since it does not have any 4G BBUs, operator 2 does not report any direct emissions."
After applying the allocation factors, this input data becomes:
The total carbon impact of operator 1 for the mobile network in the assessment year 2022, according to the ISP PCR calculation methodology, is 2,304.5 tonnes of CO_2 eq., including:

- 1,975.8 tonnes of CO_2 eq. depending on the amount of data exchanged on the network
- 328.7 tonnes of CO_2 eq. of fixed load to be distributed according to the number of subscribers

The total carbon impact of operator 2 for the mobile network in the assessment year 2022, according to the ISP PCR calculation methodology, is 2,141.5 tonnes of CO_2 eq., including:

- 1,939.8 tonnes of CO_2 eq. depending on the amount of data exchanged on the network
- 201.7 tonnes of CO_2 eq. of fixed load to be distributed according to the number of subscribers

Step 4:

To express the impacts of its network at one subscriber according to its data consumption (functional unit), the following allocation rules shall apply:

- **Time allocation**: the carbon impact calculated over the assessment period will be allocated on a monthly basis over the 12 months of the communication period (allocation factor = 1/12).
- **Allocation by data volume**: the "type a" monthly carbon impact will be divided by the amount of data exchanged during the previous month (month m of year y-1), then multiplied by the amount of data consumed by the subscriber in question during the month (month m).
- **Allocation to the number of subscribers**: the "type b" monthly carbon impact will be divided by the number of subscribers of operator i during the previous month (month m of year y-1).

Let's apply step 4 to operator 1.

During the 2023 communication period, Operator 1 will have to report 192.0 tonnes of CO_2 eq. per month, including:

- 164.6 tonnes of CO_2 eq. depending on the amount of data exchanged on the network *(calculation performed = 1,975.8 / 12)*
- 27.4 tonnes of CO_2 eq. of fixed load to be distributed according to the number of subscribers *(calculation performed = 328.7 / 12*)

Consider that operator 1 wants to report the carbon impact of a subscriber using the mobile network in September 2023 with a consumption of 15.6 GB.

Operator 1	**August 2023**	**September 2023**
Amount of data exchanged during the month (in TB)	66,000	67,400
Number of subscribers during the month	13,201,000	13,250,000

For September 2023, the ax+b model of operator 1's mobile network is:

$GWP_{(Operator\ 1,\ Mobile\ Network,\ Sep\ 23)} = A_{(Operator\ 1,\ Mobile\ Network,\ Sep\ 23)} \times Data + B_{(Operator\ 1,\ Mobile\ Network,\ Sep\ 23)}$

$A_{(Operator\ 1,\ mobile\ network,\ Sep\ 23)}$ = 164.6 t CO_2 eq. / Amount of data exchanged in August 2023
= 164.6 t CO_2 eq. / 66,000
= 2.49E+00 g CO_2 eq. for 1 GB per month

$B_{(Operator\ 1,\ mobile\ network,\ Sep\ 23)}$ = 27.4 t CO_2 eq. / Number of subscribers in August 2023
= 27.4 t CO_2 eq. / 13,201,000
= 2.07E-03 c for 1 subscriber per month

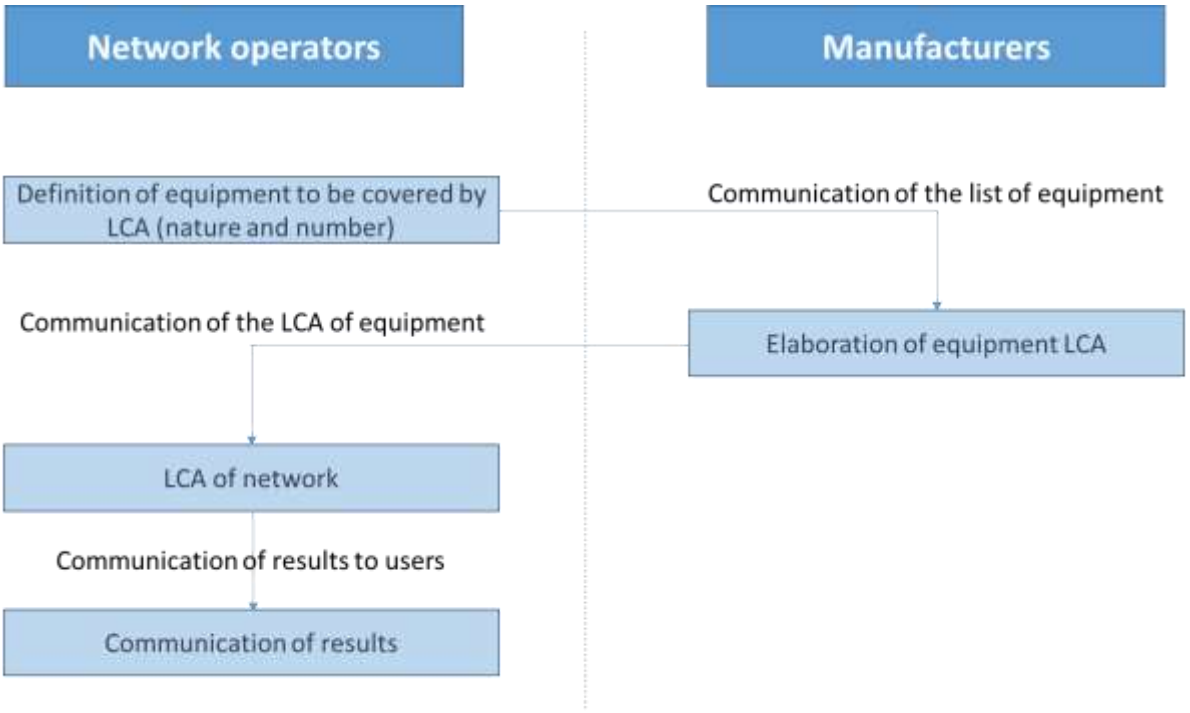
The carbon impact of a subscriber using the mobile network of operator 1 in September 2023 with a consumption of 15.6 GB is:

$GWP_{(Operator\ 1,\ mobile\ network,\ subscriber,\ Sep\ 23)}$
= $A_{(Operator\ 1,\ mobile\ network,\ Sep\ 23)} \times 15.6\ GB + B_{(Operator\ 1,\ mobile\ network,\ Sep\ 23)}$
= 2.49E+00 g CO_2 eq. × 15.6 GB + 2.07E-03 g CO_2 eq.
= 39.0 g CO_2 eq.

12.2. Annex B - Overall network LCA process

The purpose of this annex is to identify the process of collecting and exchanging the various life cycle analyses between operators and equipment manufacturers. This annex is provided in English to enable international dissemination of the process.

The process to develop specific networks LCA must be shared between operators and manufacturers to ensure each actor has sufficient time to perform required actions.
The following process and planning is for information and can be adapted by manufacturers and operators.



This process must be repeated for each update of network LCA. In this case, many LCA equipment items will of course already be available for operators directly from their vendors. Only updates of equipment LCA or new equipment LCA will then be necessary for operators directly from their vendors.

12.3. Annex C – Selection of data studied

An initial modelling of the environmental impacts of fixed/mobile networks at the France level was carried out as part of the study on the environmental impacts of digital technology in France conducted by the ADEME and the ARCEP. The results show us that the Network Access tier of the network is the source of the vast majority of impacts, due to the number of individual impacts from base stations. These results enabled us to define that the equipment for which specific data were expected would be prioritised on the Access side.

The environmental impact distribution matrix was constructed from the LCAs of network equipment as part of NégaOctet (Perfecto 2018) - (Source: https://librairie.ademe.fr/consommer-autrement/5226-evaluation-de-l-impact-environnemental-du-numerique-en-france-et-analyse-prospective.html):

ACCESS equipment			
Network	Technology	Block diagram element	Distribution of the network's environmental impacts
FIXED	Common	Collection router/switch on OCN[36] and/or SCN[37] Optical fibre Copper cable	Medium
	xDSL	IAD[38]/CPE[39] unit (ADSL modem with integrated Wi-Fi router DSLAM[40]	High
	FTTH Fibre	IAD/CPE unit without ONT[41]/SFP[42] (Wi-Fi router)	High
		ONT (external)	High
		IAD unit with integrated ONT/SFP (Wi-Fi router with integrated ONT or SFP)	High
		OLT[43]	Medium
	FTTLA Fibre	IAD unit/CPE cable (Wi-Fi router with integrated DOCSIS modem)	High
MOBILE	Common	Multi-band passive antenna (1.4 m to 2.7 m)	High
		RU amplifier (700, 800, 900, 1,800, 2,100, 2,600 MHz)	Low
		RRU[44]/RRH[45] amplifier (700, 800, 900, 1,800, 2,100, 2,600 MHz)	High
	2G (GSM)	BTS[46] - 2G BBU[47]	High
	3G (UMTS)	NODEB - 3G BBU	High
	4G (LTE)	ENODEB - 4G BBU	High
	5G (NR)	GNODEB - 5G BBU	High
		AAS - 3.5 GHz Active Antenna	High
	Transport	Radio site collection router	High
		Microwave - ODU[48] - Passive antenna	Low
		Microwave - ODU - RF[49]r amplifier	Low
		Microwave - IDU[50]	Low

[36] Optical connection node
[37] Subscriber connection nodes
[38] Integrated Access Device
[39] Customer Premise Equipment
[40] Digital Subscriber Line Access Multiplexer
[41] Optical Network Termination
[42] Small Form-factor-Pluggable
[43] Optical Line Termination
[44] Remote Radio Unit
[45] Remote Radio Head
[46] Base Transceiver Station
[47] Baseband Unit
[48] Outdoor Unit
[49] Radio Frequency
[50] Indoor Unit

12.4. Annex D – Equipment LCA methodology

The purpose of this annex is to present information to be monitored in order to carry out the life cycle analysis of an equipment item (for equipment for which primary data is expected). This annex is provided in English to allow the operators' methodology to be disseminated to international equipment players.

ISP environmental labelling - manufacturers equipment LCA specificities

1. Regulatory references

This document aims to present the process followed by manufacturers in order to provide LCA of internet service provision equipment.

2. Definitions

Primary (specific) data: data collected specifically for the considered system, based on measured or calculated data

- This data is developed from manufacturers.
- This data is to be used by operators using those specific systems.

Secondary (generic) data: data that is not specific to the considered system, based on average data, databases or assumptions

- This data is either developed jointly by manufacturers or is available in databases.
- This data is to be used by all operators.

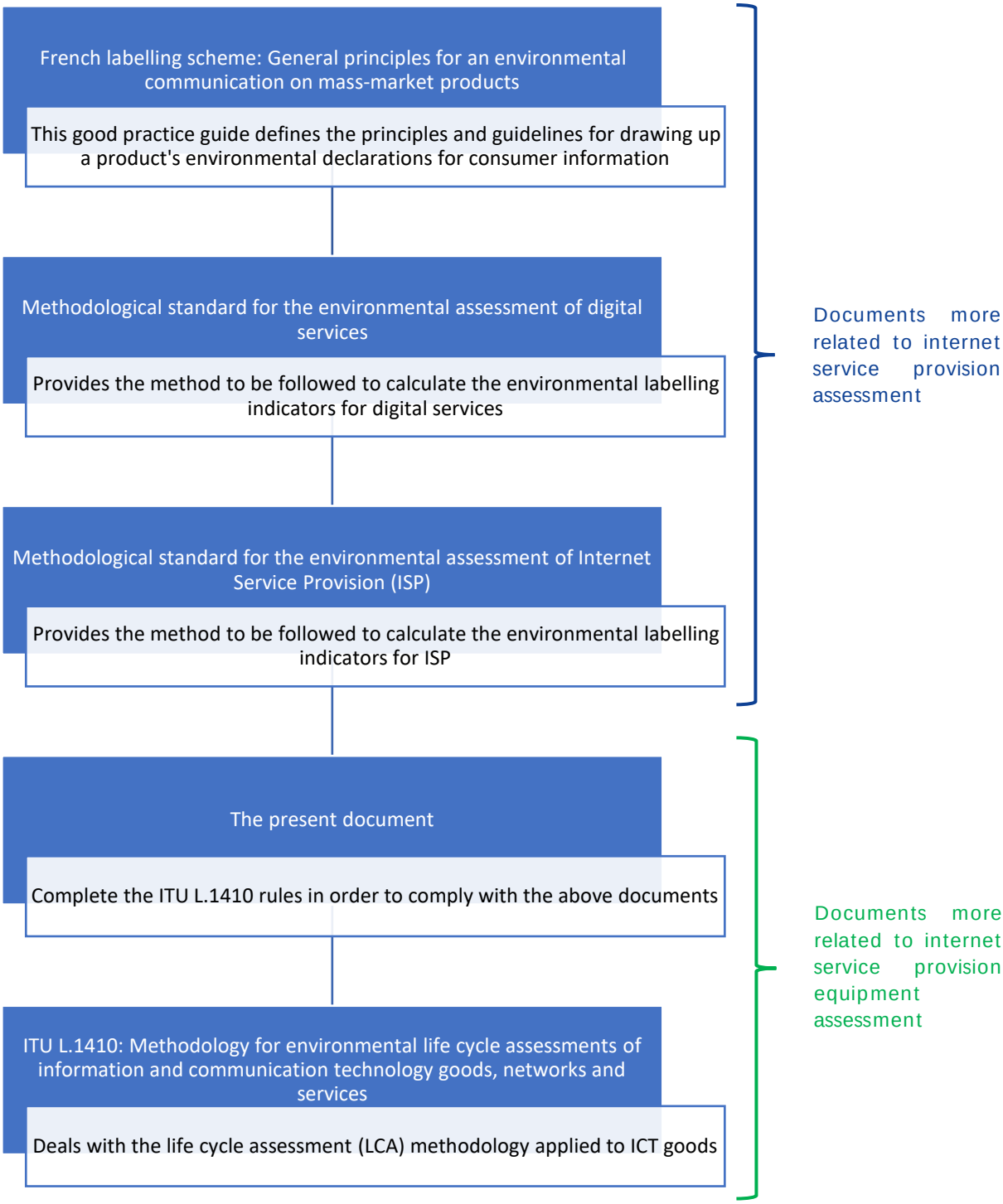
Both types of data are concerned by this document, unless specifically defined.

3. Hierarchy of documents

Documents relevant for the development of equipment LCA are as follows:

- French labelling scheme: General principles for an environmental communication on mass-market products
- Methodological standard for the environmental assessment of digital services
- Methodological standard for the environmental assessment of Internet Service Provision (ISP)
- ITU L.1410: Methodology for environmental life cycle assessments of information and communication technology goods, networks and services
- The present document

Those documents have a hierarchical dependency, as follows:



4. Methodology framework for the equipment datasets (generic and specific data)

This part present elements that are different to or complement ITU L.1410. Both documents shall be used to provide LCA of equipment.

4.1. Life cycle perimeter (inclusions/exclusions)

Inclusions:

Environmental labelling	ITU L.1410		PCR coverage	
Life cycle stage	Tag	Life cycle stage		
Manufacturing, distribution & installation	A	Acquisition of raw materials		
	A1	Extraction of raw materials	Obligatory	→ Included
	A2	Processing of raw materials	Obligatory	→ Included
	B	Production		
	B1	IT equipment production		
	B1.1	Component production	Obligatory	→ Included
	B1.2	Assembly	Obligatory	→ Included
	B1.3	Support activities for IT equipment manufacturers	Not taken into account	→ Not included
	B2	Production of support equipment		
	B2.1	Production of support equipment	Obligatory	→ Out of scope
	B3	Construction of the specific IT site		
	B3.1	Construction of the specific IT site	Obligatory (integration method under development)	→ Out of scope
Use	C	Use		
	C1	Use of IT equipment	Obligatory	→ Included only for CPE
	C2	Use of support equipment	Obligatory	→ Out of scope
	C3	Operator support activities	Not taken into account	→ Out of scope
	C4	Support activities of the service provider	Mandatory: installation / uninstallation of routers (to be validated according to the proportion of displacement)	→ Out of scope
End of life	D	Equipment end-of-life treatment		
	D1	Preparing IT equipment for reuse	Obligatory	→ Included
	D2	End of life of IT equipment End of life of support equipment?		
	D2.1	Storage / disassembly / dismantling / crushing	Obligatory	→ Included

Note: CPE means Customer Premise Equipment, equipment installed on the consumer premises.

Exclusions:

- Flows related to Research & Development
- The flows related to the transport of employees from home to the workplace and business trips
- Flows related to services associated with a product or system such as advertising, sales prospecting and marketing
- Flows linked to sales services (stores, after-sales service, etc.)
- Flows related to administrative services

4.2. Functional unit

The functional unit must be a declared unit (e.g. production, distribution and end of life of one product) i.e. in ITU L.1410, 6.2.2.2 terms: "total ICT good use per lifetime of ICT good" using the guidelines from the PEFCR Guidance V6.3 (Table 1. Four aspects of the FU with additional requirements for food and non-food PEFCRs)

4.3. Identification of most relevant processes / Semiconductor accounting

The ITU L.1410 table E.1 provides details on requirements for different kinds of parts.
In addition, as semiconductors generate most of the production impact, the assessment must take into account:

- **The surface of semiconductors**:

Considering precisely the area of semiconductors is indeed a key factor, which has been demonstrated in several LCAs of ICT equipment, carried out by the OEMs or the operators. In order to have the area measured properly, we could add guidelines on different available techniques to be used for optimal results. For example, grinding the moulding compound with a rotary tool (e.g. Dremel) or sanding paper, dissolve the component in strong acids to leach the moulding compound, peel off the moulding compound with a utility knife, use X-rays, obtain data directly from the integrated circuit/chip manufacturer or refer to assessments carried out by external parties such as TechInsights or SystemPlus Consulting. In all cases involving direct measurement, the practitioners need to be aware that some integrated circuits may contain several semiconductor chips (also known as dies). The chips can be stacked (assembled one on top of the other, for example in NAND integrated circuits) or in a multichip configuration (several chips positioned close to each other, for example in RF components). In the case of stacked dies, the practitioner needs to continue the disassembly process until the bottom of the stack is reached to be able to take into account the total semiconductor area.
The default value can be used for:

- *Random-access memory, RAM Y GB surface = Y x 60 mm^2 die area*
    - *Example: 480 mm^2 die area for a RAM of 8 GB*
- *Processor, DRAM, 2D and NAND type semiconductor, silicon substrate, PBGA/TFBGA encapsulation, 800 mm^2 die area*

Mention: We assume that these values will be more penalising over time as technology improves.

- **The percentage of losses/yield**

The semiconductor is currently mainly manufactured on disks called wafers. As the chips are square or rectangular in shape, there will be inevitable losses at the edge of the wafer. Furthermore, the yield of the manufacturing process drops significantly near the edge of the wafer. Thus, the chips located beyond what is called the exclusion edge are considered as partial rather than good. They might be used for applications requiring lesser performance, but not for the initial one (for instance they might not be able to reach a certain frequency with a given voltage). When the chips are diced from the wafer some space has to be reserved for the scribe line (also known as saw street), both in horizontal and vertical directions. In addition, as the semiconductor manufacturing process is not perfect, losses occur, usually represented by the D0 factor (defect density, expressed in number of defects per cm^2).
All in all, the yield to manufacture chips will not be 100% and the bigger the chip, the further it will be from this value. As the semiconductor's environmental impact is significant, it is recommended to take the actual yield into account, and at each chip level. For this purpose, calculators, such as the one available on Caly-Technologies website (see https://caly-technologies.com/die-yield-calculator/), can be used. It should be noted that the values for horizontal scribe lane, vertical scribe lane, edge loss and defect density are rather conservative.

As such, it is encouraged to input the actual values obtained from the chip manufacturer. Note that the diameter of the wafer must be selected accordingly (most likely 200 or 300 mm).

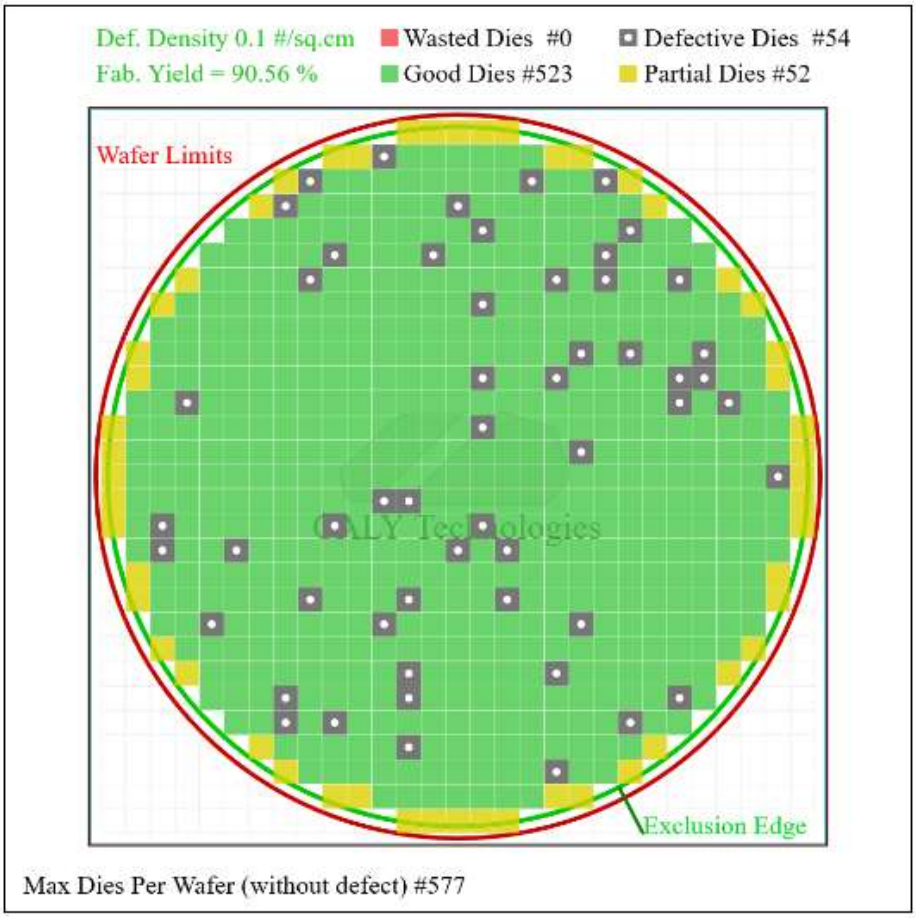


Figure 16- Example of dies mapping (10 × 10 mm components) on a 300 mm wafer (Source: Caly-Technologies)

Figure 1 shows an example of yield calculation for a hypothetical 10 × 10 mm chip, mapped on a 300 mm wafer, using the default parameters for scribe lanes, edge loss and defect density. Out of the 629[1] chips that could physically fit on the wafer, only 523 are considered good, thus giving a yield of 83.15%. The yield can also be considered at an area level, by dividing the total area of the manufactured chips (i.e. 523 × 10 × 10 mm = 52,300 mm²) by the total area of the wafer (i.e., π × 150 × 150 mm = 70,686 mm²), which gives a 73.99% surface yield.

- **The number of masks/size of lithography (7 nm, etc.)**

In addition to considering manufacturing losses, taking into account the complexity of each chip is also recommended. This can be done by considering the mask count of each chip and the applied technology node (e.g. 16, 12, 10 or 7 nm).

Data for several types of chips can be obtained from dedicated third parties (see for example IC Knowledge[2]). The figure below shows an example of data for logic chips applicable for recent technology nodes and forecasts for future ones.

[1] 523 good + 54 defective + 52 partial dies = 629 total

[2] https://www.icknowledge.com/index.html and https://semiwiki.com/wp-content/uploads/2020/03/Lithovision-2020.pdf

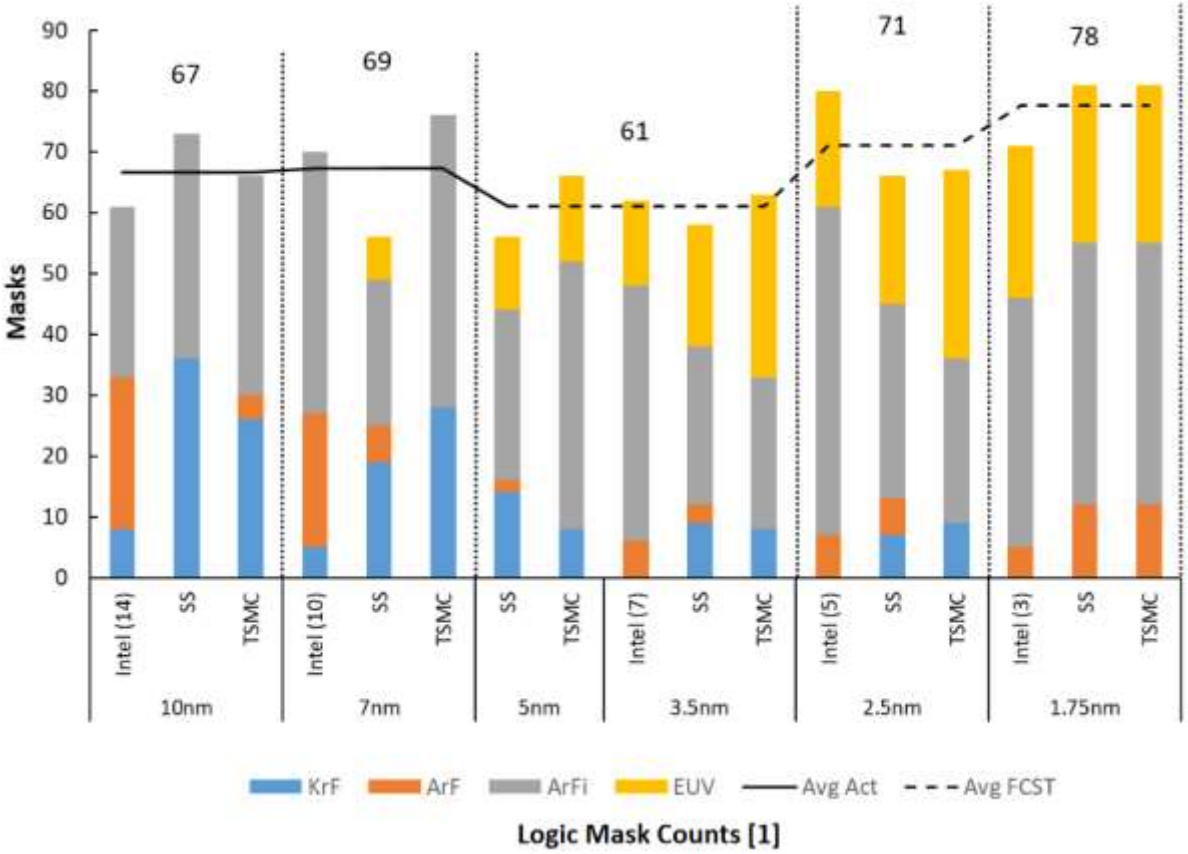


Figure 17- Example of data on mask count for logic chips manufactured by 3 companies (Intel, Samsung and TSMC) according to different technology nodes (from 10 to 1.75 nm – Source: Economics in the 3D Era – Scotten W. Jones – 2020)

Applied to life cycle assessment, this data can be used to improve the life cycle inventory of the semiconductor selected in the LCA software database. This can be done by using figures from the semiconductor manufacturer CSR report. For instance, TSMC's document[3] features data about the carbon footprint "per mask per 12 inches (i.e. 300 mm) equivalent wafer". This value, combined with the mask count determined with data such as presented in Figure 2, can then be used to double check if the life cycle impact assessment (LCIA) values obtained with the semiconductor data from the LCA software database are correct.

Note that if one or two of these advanced modelling methods are considered in the LCA, it must be clearly stated in the assumption that it will have a significant effect on the environmental footprint results.

Lithography Process (nm)	Number of masks
5	70
7	75
8	70
12	64
14	58
16	55
22	54
28	50
45	42
65	38
90	33
130	29

[3] https://esg.tsmc.com/download/file/2020-csr-report/english/pdf/e-all.pdf

Source: https://nikonereview.com/2018/ic-knowledge-president-shares-view-of-semiconductor-landscape-at-nikon-symposium/

As the information above shows, the determination of different categories for the number of masks can be used: The default value for the number of masks can be used for:

- *RAM: 45 masks*
- *Processor, DRAM, NAND: 75 masks*

Synthesis

To be more precise, the following roadmap can be used for the following components: *Processor, DRAM, NAND and RAM.*

1-With the manufacturers/roadmap find what the engraving fineness of the chip is

2-Look on the appropriate figure of IC Knowledge how many masks are necessary (on average or according to the manufacturer). For example: for an RAM chip engraved in 1Z from SK Hynix, this will be approximately 65 masks.

3-The data from the CSR report of TSMC can be used to assess the carbon impact of the chip (TSMC gives an impact in "g CO2eq/mask on a 300 mm equivalent wafer"), as we know the number of masks and how many chips we can put on the wafer (via two previous steps on measuring the size of the chip and taking losses into account).

4-Compare this carbon footprint value with the value obtained via "simple" modelling using a database such as EcoInvent/CODDE/Gabi and adjust accordingly.

4.4. Cut-off rules

There are three criteria to be considered for the cut-off:

a) The mass of intermediate flows not taken into account shall be less than or equal to 5% of the mass of the elements of the reference product corresponding to the functional unit,

b) Flows or processes whose total energy content does not exceed 5% of the energy content of the product used to fill the functional unit can be neglected. The energy content of a material is the energy required to produce it. These data are provided by the generic database.

c) The environmental impacts not taken into account shall be less than or equal to 5% of the total environmental impacts generated during the life cycle of the reference product corresponding to the functional unit.

For all three of these criteria, total cumulated flows of less than 5% of the reference flow can be excluded.

4.5. Distribution

The distribution is considered from factory gate to place of use.
The allocation of impacts must be based on limiting factor (mass, volume or area).
Empty return trips must be accounted for.

4.6. Use scenario (CPEs only)

The use scenarios must be defined for each relevant equipment item between operators and manufacturers based on the applicable version of the EU Code of Conduct on Energy Consumption of Broadband Equipment Version 8.0 (current version valid for 2021 and following years).
They must be based on realistic conditions of use.
Specific scenarios for the units will be detailed in this document so that all operators have the same ones (Annex E).

4.7. Data for electricity use (Use phase)

Electricity mixes from Base Impacts must be used.

4.8. End of life formula

The 100/0 allocation method should be used.

4.9. Allocation of co-products

The same allocation method shall be used for all environmental loads for all products from a common process.
The study shall identify the processes shared with other product systems and deal with them according to the stepwise procedure presented below.

- Step 1: subdivision or expansion of the system
- Step 2: if not possible, then use of physical relationships for allocation (e.g. mass)
- Step 3: if not possible, then use other relationships for allocation (e.g. market value of the scrap material or recycled material in relation to the market value of primary material).

4.10. Impact indicators

The impact indicators method to be used is the EF 3.0 indicators method available at: https://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml;jsessionid=709B96AC321CDB25136F14DC898E037B

Mandatory indicators

- Depletion of natural resources (minerals and metals)
- Climate change
- Acidification
- Particulate matter
- Ionising radiation

Optional indicators

- Primary energy consumption
- Depletion of water resources
- Human toxicity – cancer
- Human toxicity – non-cancer
- Ecotoxicity
- Water use

4.11. Quality

The quality level of data can be expressed depending on several categories. The categories from the document "French labelling scheme: General principles for an environmental communication on mass-market products" are compulsory, while the additional categories from ITU L.1410 are optional.

French labelling scheme: General principles for an environmental communication on mass-market products (mandatory)	ITU L.1410 (optional)
Methodological relevance	Methodological appropriateness and consistency
Completeness	Completeness (total LCA level)

Precision	Uncertainty
	Data representativeness
Time representativeness	Data age (timeliness)
	Acquisition method
	Supplier independence
Geographic representativeness	Geographical correlation
Technological representativeness	Technological correlation
	Cut-off rules (rules of inclusion/exclusion)

4.12. Verification

The standard used for the verification is the ISO 14071 "Environmental management – Life cycle assessment – Critical review processes and reviewer competencies"
Following the requirements of PEP ecopassport program, specific LCI datasets should have been checked by independent experts with a data quality indicator (DQR – Data Quality Rating) [...]. At a minimum, specific LCI datasets for the unit **must** have been checked by independent experts attesting to their conformity with this PCR and in particular this annex.
For the other equipment, specific LCI datasets **should** be checked by independent experts attesting to their conformity with this PCR and in particular this annex. A minimum of traceability for the other equipment must be used (mention of the data source, independent internal or external verification carried out).

4.13. Validity of the data

The validity of the LCA of equipment is 5 years. It must be updated if there is a variation of more than 20% in one environmental impact.

12.5. Annex E – Methods for assessing the amount of data consumed by a subscriber

There are currently three methods for assessing the amount of internet data consumed by a subscriber via access to fixed networks. Within the framework of the obligation of art. 13.III of the AGEC law, no method is imposed on internet service providers. However, each method has its limitations, which are illustrated in this annex.

Method 1: **Collecting information directly at customer devices**

Information is collected directly at the device level, using the ACS platform. Each of the devices (IAD) locally counts all of the packets that pass through the WAN. The information for each packet is aggregated locally and sent back to the rest of the network every 15/30 mins.

The limits

- This method requires hardware implementation by ISPs at the device level for the extensive processing of customer data to count and store the data;
- Some devices are not powerful enough for this implementation: notably ADSL units and some old LiveBox models;
- Customer data may be lost for customers who switch off their device and do not have flash memory on their device.

Recommendations: In this case, it is recommended to use an average traffic value of a DSL customer of the ISP for those customers for which no data can be collected.

Method 2: Collecting information at the level of authentication and counting systems

PE routers (BNG Broadband Network Gateway) manage customer authorisation, but also regularly (every two hours) associate IPs with a customer device. The BNG interacting with a radius server could allow, with ISP-side implementation, to count and transmit to the rest of the network the throughput of a customer.

The limits

- An ISP-side implementation is required to update the radius servers to take into account the data volume tickets transmitted by the BNGs (Broadband Network Gateways);
- In non-unbundled areas, data volume tickets are not returned.

Recommendations: In this case, it is recommended to use an average traffic value of a DSL customer of the ISP for those customers for which no data can be collected.

Method 3: Collecting information at the data warehouse level *transitional period*

While waiting for methods 1 and 2 to be implemented, some operators may turn to a third collection method. Via video messaging platforms, customer data on all communications (with source and destination IP address, data volume) are stored in the operator's data warehouse. By aggregating some of this information, the operator can track the volume of traffic emitted by all of its customers.

The limits

- An ISP-side implementation is required for this calculation per customer;
- Some customers may have the same IP address;
- Peer-to-peer flows between user devices are not counted.

12.6. Annex F – Explanatory note to annex C.2 of the ARCEP decision on the implementation of annual environmental data collection

This protocol was developed in consultation with the electronic communications operators Orange, Free, SFR and Bouygues Telecom, as part of the preparation of the ARCEP's annual environmental data collection decision.

The latest version is available at the following link: https://www.arcep.fr/actualites/les-consultations-publiques/p/gp/detail/decision-relative-collecte-annuelle-donnees-environnementales-280722.html. As part of the version of the ISP standard, the latest version of the ARCEP protocol will be used. For any change to the document during the assessment period (year y), the version of 1 January of year y shall be used.

12.7. Appendix G – Network hosting site configurations

Network hosting site configuration	Unit	Small	Medium	Large	OCN	Terrace	Pylon
Urbanisation							
Concrete	m3	200	800	4,000	400	400	10
Steel	kg	29,400	117,600	588,000	58,800	58,800	1,470
High current and distribution							
Transformer	unit	-	1	1	-	-	-
Low Voltage Switchboard (LVS)	unit	-	1	1	1	-	-
High-Quality Articulated Panel (HQAP)	unit	-	2	6	-	-	-
Electrical safety							
Inverters	unit	-	-	4	-	-	-
Batteries	unit	-	-	48	-	-	-
48V workshop							
Rectifier	unit	-	6	9	-	-	-
Air conditioning							
Air conditioner	unit	-	8	14	4	-	-
Air Handling Unit (AHU)	unit	-	1	1	-	-	-
Backup power							
Power generator	unit	-	1[51]	1[52]	-	-	-
Filled fuel oil tank	unit	-	2[53]	1[54]	-	-	-

[51] Use generators between 200 and 275 kW
[52] Use generators between 800 and 2MW
[53] Use 2,500-litre oil tanks with a 72 hr autonomy (double the tanks when the power generators are doubled)
[54] Use 20,000-litre oil tanks with a 72 hr autonomy (double the tanks when the power generators are doubled)

12.8. Annex H – List of CPA codes concerned

CPA code	Description
J	INFORMATION AND COMMUNICATION SERVICES
60	Programming and broadcasting services
60.2	Television programming and broadcasting services; broadcasting originals
60.20	Television programming and broadcasting services; broadcasting originals
60.20.1	Television programming and broadcasting services
60.20.11	Linear television programming and broadcasting services
61	Telecommunications services
61.1	Wired telecommunications services
61.10	Wired telecommunications services
61.10.1	Data and message transmitting services
61.10.11	Fixed telephony services - access and use
61.10.12	Fixed telephony services - calling features
61.10.13	Private network services for wired telecommunications systems
61.10.2	Carrier services for wired telecommunications
61.10.20	Carrier services for wired telecommunications
61.10.3	Data transmission services over wired telecommunications networks
61.10.30	Data transmission services over wired telecommunications networks
61.10.4	Wired Internet telecommunications services
61.10.41	Internet backbone services
61.10.42	Narrow-band Internet access services over wired networks
61.10.43	Broad-band Internet access services over wired networks
61.10.49	Other wired Internet telecommunications services
61.10.5	Home programme distribution services over wired infrastructure
61.10.51	Home programme distribution services over wired infrastructure, basic programming package
61.10.52	Home programme distribution services over wired infrastructure, discretionary programming package
61.10.53	Home programme distribution services over wired infrastructure, pay-per-view
61.2	Wireless telecommunications services
61.20	Wireless telecommunications services
61.20.1	Mobile telecommunications services and private network services for wireless telecommunications systems
61.20.11	Private network services for wireless telecommunications systems
61.20.12	Mobile voice services
61.20.13	Mobile text services
61.20.14	Mobile data services, except text services
61.20.2	Carrier services for wireless telecommunications
61.20.20	Carrier services for wireless telecommunications
61.20.3	Data transmission services over wireless telecommunications networks
61.20.30	Data transmission services over wireless telecommunications networks
61.20.4	Wireless Internet telecommunications services
61.20.41	Narrow-band Internet access services over wireless networks
61.20.42	Broad-band Internet access services over wireless networks

61.20.49	Other wireless Internet telecommunications services
61.20.5	Home programme distribution services over wireless networks
61.20.50	Home programme distribution services over wireless networks
61.3	Satellite telecommunications services
61.30	Satellite telecommunications services
61.30.1	Satellite telecommunications services, except home programme distribution services via satellite
61.30.10	Satellite telecommunications services, except home programme distribution services via satellite
61.30.2	Home programme distribution services via satellite
61.30.20	Home programme distribution services via satellite
61.9	Other telecommunications services
61.90	Other telecommunications services
61.90.1	Other telecommunications services
61.90.10	Other telecommunications services

Table 18: CPA codes

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ABBREVIATIONS AND ACRONYMS

ADEME	French Environment and Energy Management Agency
PCR	Product Category Rules

ADEME IN BRIEF

At ADEME - the French agency for ecological transition - we are firmly committed to the fight against global warming and resource degradation.

On all fronts, we are mobilising citizens, economic players and regions, giving them the means to move towards a resource-efficient, low-carbon, fairer and more harmonious society.

In all areas - energy, air, circular economy, food, waste, land, etc. - we advise, facilitate and help finance many projects, from research to sharing solutions.

At all levels, we put our expertise and foresight capacities to work on behalf of public policy.

The ADEME is a public institution under the supervision of the French Ministry of Ecological Transition and Ministry of Higher Education, Research and Innovation.

THE ADEME COLLECTIONS

FACTS AND FIGURES
The ADEME as a reference: It provides objective analyses based on regularly updated numerical indicators.

KEYS TO ACTION
The ADEME as a facilitator: It develops practical guides to help players to implement their projects methodically and/or in compliance with the regulations.

THEY DID IT
The ADEME as a catalyst: The players share their experiences and know-how.

EXPERTISE
The ADEME as an expert: It reports on the results of research, studies and collective achievements carried out under its supervision

HORIZONS
The ADEME looks to the future: It proposes a forward-looking and realistic vision of the challenges of the energy and ecological transition, for a desirable future to be built together.

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

ADEME
AGENCE DE LA TRANSITION ÉCOLOGIQUE

FAITS & CHIFFRES

GENERAL PRINCIPLES FOR THE ENVIRONMENTAL LABELLING OF CONSUMER PRODUCTS

This methodological standard for the environmental assessment of Internet Service Provision provides the method for calculating the environmental labelling indicators of this product category.

This document supplements and clarifies the sectoral rules of the "parent" PCR: "Methodological standard for the environmental assessment of digital services" for the case of telecommunication networks and internet access provision, and should be read in parallel.