GENERAL PRINCIPLES FOR ENVIRONMENTAL COMMUNICATION ON MASS MARKET PRODUCTS

PART 25: METHODOLOGICAL GUIDELINES FOR THE ENVIRONMENTAL ASSESSMENT OF CLOTH NAPPIES

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Foreword

This guide was prepared by working group WG 4H “Hygiene” attached to the “environmental communication on mass-market products” platform coordinated by ADEME (Mrs. GAUDRON/Mr. FOURDRIN) with the AFNOR secretary (Mr. BALCAEN).

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Scope

This guide is specifically dedicated to cloth nappies.

The purpose of this guide is to:

— set a methodological framework for assessing the environmental impacts, and

— simplify the calculation method to facilitate environmental communication reporting for businesses that market *cloth nappies*.

1. Functional unit and reference flow

1.1. Product assessed

The product assessed is a cloth nappy. Cloth nappies are generally composed of a waterproof textile outer wrap and an absorbent textile inner core, all of which can be washed a reused over and over again. There are several different cloth nappy systems, each composed of different components—as inventoried here in Annex B.

Associated CPA code: 13.92.29 Other made-up textile articles.

Although this CPA code is broader than just cloth nappies, the guide herein only covers this one product category.

1.2. Functional unit

The functional unit employed for the cloth nappies category is the following:

“Changing the baby’s nappies for 24 hours”

Justification for adopting this functional unit:

— The function(s)/services(s) provided: “what?”; change the baby’s nappy.

— The magnitude of the function or service: “how much?”; Number of nappy kit supplies needed (see Annex B) to cover service for one baby.

— The desired level of quality: “how?”; With an appropriate kit (sufficient number of nappy systems) and appropriate treatment (washing and drying) to ensure the nappies stay clean and dry (see Annex B).

— The product’s life (span): The period of use accounted for is 2 × 2.5 years, corresponding to a number of nappy change systems used on 2 children in succession, ratioed back to a 24-hour figure.

1.3. Reference flow

Number of nappy system changes used per day is defined as 5.15[1] changes/day/child, for two children (i.e. a number of changes per day over a 5-year period), ratioed back to a 24-hour figure. The reference nappy size for multi-size cloth nappies is size M.

A baby change is defined as a combination of components (see ‘combinations’ under Annex B). Assessing use on 2 children (taking the use period to 5 years) makes it possible to gauge the degree of accessory wear between systems, given that most children will be in nappies from birth to age 2½ years old[2].

[1] Source [LCA–GP]

[2] Source [UKN, UKN8] and [LCA–GP]

1.4. Cloth nappies—systems and components

The table below (Table 1) inventories the full panel of nappy systems found on the French market and the different component features of the cloth nappies (Table 2).

The systems are identified in terms of: system kit components, system materials used, systems in one-size-fits-all and systems in 3 sizes according to the child's age.

Environmental communications will only be valid when reported per type of system (the systems are defined in Annex B). This environmental assessment reporting thus corresponds to the nappying supplies needed to serve the functional unit "changing the baby's nappy for 24 hours".

Technical details:

A washable nappy system is composed of several parts, called components.

System components:

Depending on the system used, the various components are washed after each nappy change or can be used several times over before they need to be laundered. There is also a distinction to be made between absorbent pad and absorbent nappy. Both share the same function, but the pad is a squarish piece of absorbent fabric that fits between the baby's legs whereas the absorbent nappy is shaped and wraps the baby like pants. It has elastic to fit around the folds of the baby's thighs and a system of poppers or Velcro fastenings to close around the baby's tummy.

Materials:

The component materials used can be natural fibres (e.g. cotton, hemp, wool), artificial fibres (e.g. bamboo-fibre viscose, Tencel®, Lyocell®, Modal®, etc.) and/or synthetic man-made fibres (e.g. polyester, polyamide, polyurethane, etc.). These components differentiate into two categories to measure drying time: the components that are 100%-synthetic and the components that are composed of natural or artificial fibres and blends.

Sizes:

A one-size-fits-all system adapts to the child's age by using different poppers to cinch the crotch and midriff. The "sized" fitted systems are systems that come in three sizes, from S to M and up to L, to adapt as the child is growing.

Table 1

System family	Description	Pictures and design
Basic cloth nappy	Waterproof cover paired with an absorbentnappy. The waterproof nappy cover may come into contact with urine but never with excreta. **1 blended fibres or 100%-synthetic cover + 1 absorbentnappy: blended fibres + poppers or Velcro and elastic fastenings**	
AI1 nappy (and Pocket AI1 nappy)	Absorbent nappywith a waterproof shell sewn on. The whole nappy system is changed at each nappy change. The "Pocket AI1" variant with an absorbent padto stuff between the two layers. Both nappy and pad are changed at each nappy change. **1 Waterproof AI1 nappy with/without pocket + 1 absorbent pad**	
AI2 nappy "all-in-two"	Waterproof cover that can be readily inserted with a washable absorbent pad. Variant of the cover featuring a waterproof "snap-in pad-pouch" that can be readily inserted with an absorbent pad. **1 Waterproof cover or cover featuring a waterproof 'pad-pouch' part + 1 absorbent pad**	
AI3 nappy "all-in-three"	Non-waterproof cover + separable pad-pouch + absorbent pad. The cover rarely if ever gets soiled, and the waterproof pad-pouch does not get washed after each nappy change. **1 cover + 1 waterproof pad-pouch + 1 absorbent pad**	

Table 2

Further explanation on the system components		Pictures and design
Waterproof cover (for basic cloth nappy)	A leaktight pant is a waterproof part—often in plastic—with fastenings and elastic fittings. This waterproof cover does not contain any absorbent textile padding and its only role is to stop leaks, not absorb them. **The cover does not get changed at each nappy change**	
Absorbent nappy (for basic cloth nappy)	An absorbent nappy is a piece of absorbent fabric fitted with fasteners and/or elastics to hold it snugly against the baby's skin (or a 3-grip nappy fastener system called Snappi): – viscose produced from bamboo farming, – cotton (organic or non-organic), – microfiber, etc. **The absorbent nappy is changed at each nappy change**	
Cover (for AI3)	The AI3 cover is a non-waterproof outer wrap that can be fitted with a separable snap-in pad-pouch. **The AI3 cover does not get washed at each nappy change**	
Pouch (for AI3)	The pouch is a waterproof part that snaps snugly into the cover to hold the absorbent pad in place. It is separable. **The AI3 pouch does not get washed at each nappy change**	
Absorbent pad (for AI1, AI2, AI3) (and Prefolds)	An absorbent pad is simply a piece of folded fabric designed to absorb (prefolds are simply very large pieces of layered fabric): – viscose produced from bamboo farming, – cotton (organic or non-organic), – synthetic microfiber, – Tencel (viscose), etc. **The pad (or doubler) is changed at each nappy change**	

These parameters combined together enable 24 different system permutations with varying amounts of nappying kit-up supplies. A separate starting cloth nappying kit has been established according to each nappy system, material used, and one-size or sized. The manufacturer will need to identify their system's kit components from among the panel of options on offer. The data can be found in **Annex B.**

2. Environmental impacts

The main environmental impacts for the cloth nappies category are[3]:

— Greenhouse gas emissions

— Depletion of non-renewable natural resources

— Water consumption

3. Lifecycle inventory data at the source of the environmental impacts

Environmental impacts	Impact source data
Greenhouse effect	- Electricity mix in the use phase - Production of synthetic fibre - Production and weaving of natural fibres - Manufacture of the various cloth nappy components
Depletion of non-renewable natural resources	- Electricity mix in the use phase - Production of synthetic fibre - Production and weaving of natural fibres - Manufacture of the various cloth nappy components
Resource depletion, water[4]	- Net water consumption in the use phase (washing machine cycles) - Production of textile fibres

4. Relevant impact indicators, degree of precision, and calculation methodology

The environmental impacts identified above shall be characterized using the indicators set forth in the following table. This table indicates the unit of measurement, the degree of precision, and the calculation methodology for each impact indicator. The indicators shall be expressed in the units stated in the table below ratioed to the functional units stated in section 1 of the sector-specific guide herein.

Environmental impacts	Environmental impact indicators	Unit[5]
Greenhouse effect	Greenhouse gas emissions	g eq. CO_2
Depletion of non-renewable natural resources	Depletion of abiotic resources	eq. Sb
Resource depletion, water	Resource depletion, water	eq. m^3

[3] Source [UKN, UKN8], [LCA–GP] and [LCA–GP norming]
[4] The driver contributions analysis focused on the water consumption indicator.
[5] These units, which connect back to characterization methods, are given here for informational purposes only. These methods shall comply with the General principles for environmental communication on mass market products (Part 0)

4.1. Indicators excluded

Total primary energy, acidification: as these indicators use data that is linked to greenhouse gases, they have not been adopted for the environmental assessment of cloth nappies.

Water eutrophication, stratospheric ozone depletion, photochemical smog: Only negligible impacts compared to greenhouse gas emissions and depletion of non-renewable natural resources, as calculated in earlier norming[6].

Aquatic ecotoxicity: Issue rates as relatively important for this product category according to the norming calculations and this indicator is produced using the CML methodology[7]. However, as the CML methodology is known to suffer reliability problems, this indicator is not proposed for here, although subsequent work for environmental communication reporting on cloth nappies should be keeping a close eye on it.

5. Allocation rules for products and co-products

Allocations connected to raw materials

These allocation rules will be the same as those employed in the life cycle inventories in the ADEME databases for environmental communications.

Allocation of the impacts of textile finisher facilities

A given finisher facility may be able to process several different models of apparel, and production line-level specific data is not always available.

Where the operator wants to use specific data for textile finishing, the site's consumptions and waste shall be subdivided between the different co-products processed as set out below:

— subdivision according to separate processes (allocation bypassed);

— or if this is not feasible, subdivision according to the mass of products involved.

Allocations of the impacts and benefits of recycling the product and its packaging system

Recycling textile fibre into textile fibre

The impacts and benefits of recycling are allocated to the material incorporating the recycled fibre (0/100-basis allocation). The modelling is detailed in the General principles for environmental communication on mass market products (Part 0)

Recycling non-textile fibre into textile fibre

The allocation rule adopted here is the allocation scheme for plastics specified in the General principles for environmental communication on mass market products (Part 0) (50/50-basis allocation).

Packaging (non-textile)

The impacts and benefits of recycling the (non-textile) packaging are allocated as per the rules specified in the General principles for environmental communication on mass market products (Part 0).

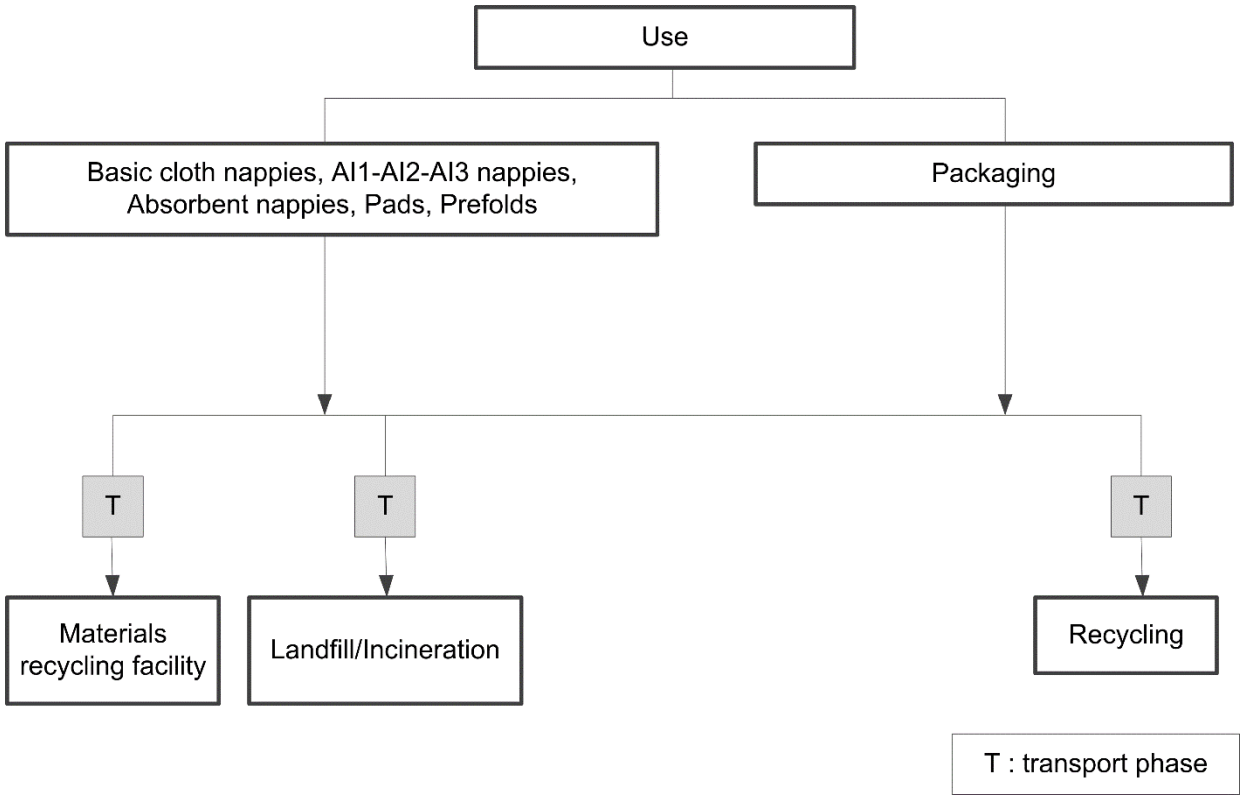
[6] Source: [UKN, UKN8], [LCA–GP] and [LCA–GP norming]
[7] Source: [LCA–GP]

Incineration

The impacts and benefits of energy recovery from the products and packaging are allocated as per the rules specified in the General principles for environmental communication on mass market products (Part 0).

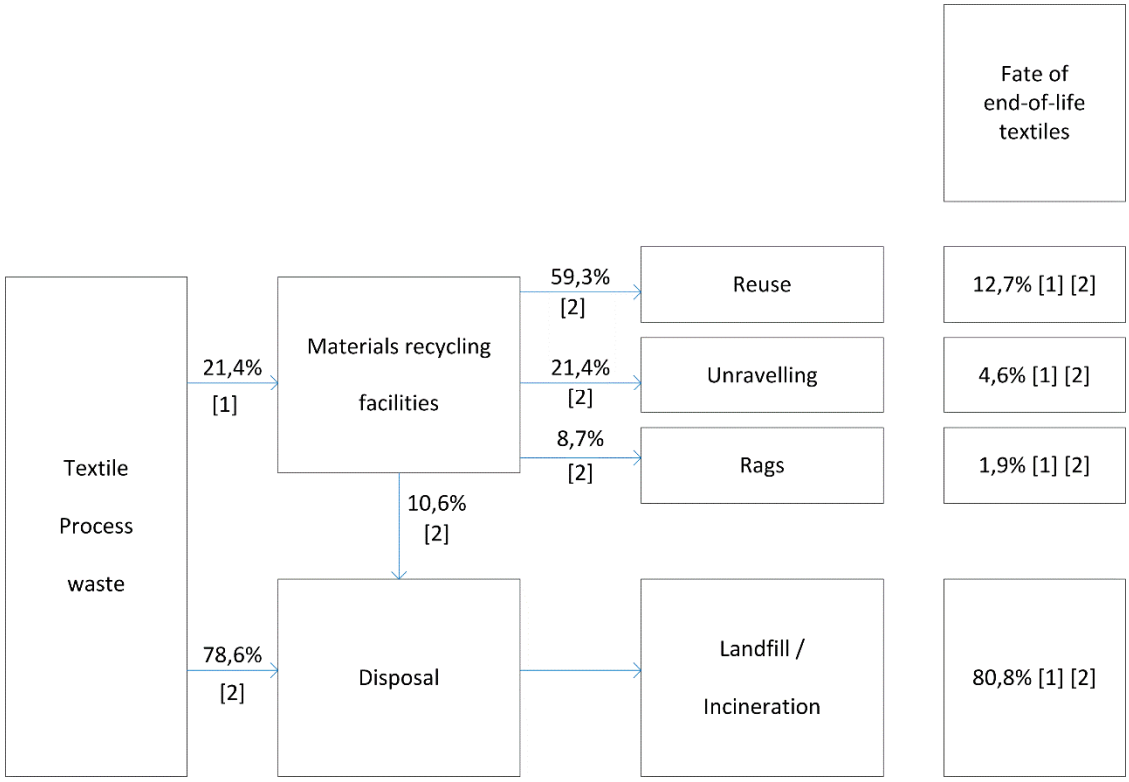
6. Conditions for taking into account end-of-life processes

The end-of-life of cloth nappies after use (and considering the nappy as 'clean') can be modelled as follows:



The scope of the environmental information is the use of cloth nappy systems distributed on the French market. Therefore, end-of-life of the cloth nappies and end-of-life of packaging shall be modelled to be representative of the situation in France. Within the framework of environmental information on cloth nappies, only the end-of-life processing treatments—excluding the collection stage—are accounted for.

The end-of-life of cloth nappies follows the governing national 'Eco TLC' clothing–linen–footwear waste regulations.



[1] The source streams were determined with input from a study currently being led by OPTIMA for the ADEME to characterize the merchandizing of clothing–linen–footwear.

[2] Household-donated clothing–linens–footwear (the 'TLC' stream in French) – 2011 figures – ADEME

6.1. Packaging

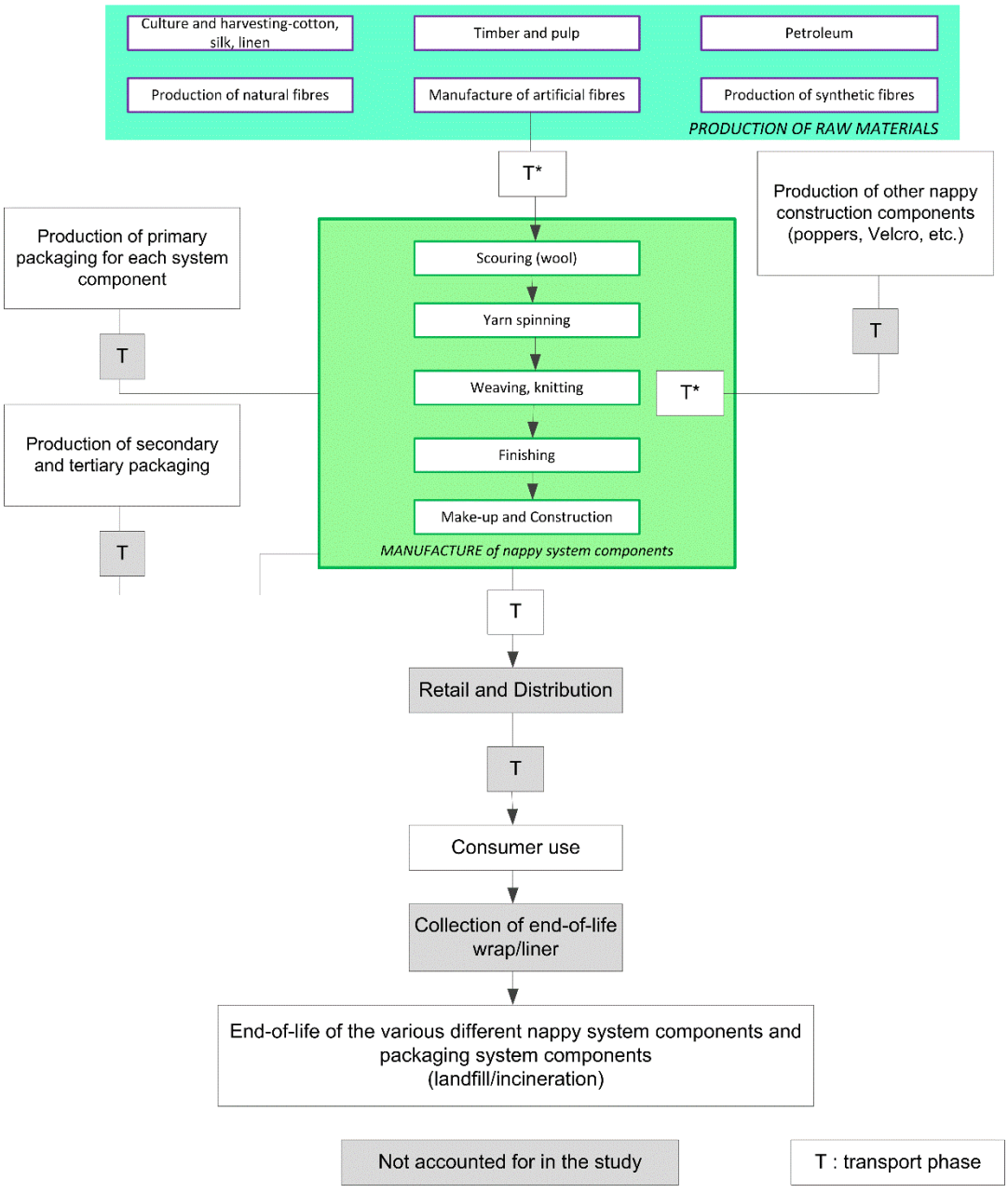
The packaging's end-of-life scenario is determined according to national end-of-life scenarios for packaging in France (recycling, landfilling and incineration rates). The end-of-life scenarios for packaging are determined on a case-by-case basis in line with the packaging's composition.

For the packaging recycling rate, the most up-to-date data available shall be used.

7. Assessment scope

7.1. Description of the life cycle and outline of the system studied

The scope of assessment of the cloth nappy shall take into account all the product life cycle stages and processes set out below:



T *: Transport between the different manufacturing stages is included in the scope of this assessment — see the default scenario proposed in Annex A.

Figure 1 — Diagram of the cloth nappies lifecycle

Some steps are excluded from the scope of the study because their influence on the environmental performance of cloth nappies is negligible. The different stages of the study's scope must be completed with the primary and secondary data or with default values. Organic cotton shall be differentiated from non-organic cotton in this study (and as soon as more comprehensive data on organic cotton becomes available).

7.2. Life cycle stages taken into account

— Production of raw materials (and place of manufacture)

— Production and end-of-life of components

— Production and end-of-life of primary packaging

— Upstream transport

— The stages involved in manufacturing the made-up textiles (made-up textile process steps including spinning, finishing, weaving, knitting, construction, bonding, coating)

— The stages involved in transport up to the warehousing

— Use phase (water consumption, electricity consumption, detergent consumption, wastewater treatment)

— End-of-life stages

7.3. Stages not accounted for in the life cycle analysis

STAGE NOT ACCOUNTED FOR	***RATIONALE FOR EXCLUDING THE STAGE***
Customer journeys between their home and the point-of-sale	In accordance with the recommendations of the "environmental communication on mass market products" platform, this stage will be the subject of a different communication directed at the end-customer.
Packaging of raw materials and intermediate inputs and the collection of the packaging outputs	Negligible contribution of the stage concerned to the environmental impacts studied (learned from experience; no calculation done).
Utility energy consumption and waste production at logistics platforms and points-of-sale	These impacts may ultimately become integrated once a sector-specific distribution methodology has been defined (this aspect is extremely variable).
The construction of production plants and infrastructures plus infrastructure lighting, heating, plumbing and cleaning	Negligible contribution of the stage concerned to the environmental impacts studied (learned from experience; no calculation done).
Construction of production-line facilities	Negligible contribution of the stage concerned to the environmental impacts studied (learned from experience; no calculation done).
Consumption of any cotton wool, wipes or any other disposables used when changing the baby's nappy	These products are not part of the system defined for the functional unit used here, and indeed are liable to be covered under their own environmental communication.

STAGE NOT ACCOUNTED FOR	*RATIONALE FOR EXCLUDING THE STAGE*
Consumption of any protective liners used	These products are optional extras used at the same time as the nappy system. These products are not part of the study scope for environmental communication reporting on cloth nappies as they are not essential nappying supplies needed to service the function as defined in the functional unit. Furthermore, despite having non-negligible environmental impacts[8], they are not a factor of differentiation between cloth nappies, which means that integrating them into the study scope would dilute the differentiability between cloth nappies. Moreover, nappy liners are liable to be covered under their own environmental communication.
The manufacture of minor clothing ingredients, which together come to a cumulative weight of less than 1% by mass.	The following accessories are disregarded as both their mass and environmental impact radius are considered negligible: price tags (excluding hang tags); woven sow-in labels; care labels; threading; twill; bias (excluding hanger loops); stitching. *For all other accessories (buttons, zips, RFID chips, etc.), the rule of a 5% cut-off by mass on energy content and environmental impact criteria shall be verified by the operator responsible for environmental communication.*
Collection of end-of-life cloth nappies[9]	Negligible contribution of the stage concerned to the environmental impacts studied (Greenhouse effect: 0.01%; Depletion of non-renewable natural resources: 0.01%; Water consumption: 0.0002%)
Secondary and tertiary packaging [10]	Negligible contribution of the stage concerned to the environmental impacts studied (Greenhouse effect: 1.22%; Depletion of non-renewable natural resources: 0.95%; Water consumption: 0.11%)

Flows tied to R&D, to employee transport from home to work and back and out-of-office missions, and to product-related services such as advertising, canvassing and marketing are ruled out of the system boundaries as it is a real struggle to allocate these flows to the product.

[8] Source: [LCA–GP]
[9] Aggregate of the two drivers: Collection of end-of-life nappies and Secondary packaging contribute 1.224% on greenhouse effect, 0.961% on depletion of non-renewable natural resources, and 0.113% on depletion of water resources, which fits the cut-off rule on environmental impact.
[9] Same as Note 5.

8. Articulation between specific, semi-specific and generic data

		PCR						IMPACTS BASE		
		Primary data		Specific data		Secondary data				
Stage	**Sub-stage**	**Activity-related data, to be linked to IMPACTS database inventory data**	**Elementary flows and data without direct links to the IMPACTS database**	**Activity-related data, to be linked to the IMPACTS database inventory data**	**Elementary flows and data without direct links to the IMPACTS database**	**Activity-related data, to be linked to the IMPACTS database inventory data**	**Elementary flows and data without direct links to the IMPACTS database**	**Processes**	**Technical representativeness**	**Geographical representativeness**
Addition asked for on Raw materials:										
Raw materials		– Amounts and types of materials (including, where relevant, percent recyclate) in the finished nappies and all textile system components. – Nappying kit needs (see Annex B)						– Production of **spun yarn** and **filament yarn** (including the spinning and fibre-preparing processes systematically associated with these fibres), including recycled yarn	– Yarn (natural fibres): -> staple cotton, sheepwool, silk and linen -> organic cotton, recycled cotton, -> "better cotton", GMO cotton, hemp – Spun yarn and filament yarn (artificial man-made fibres): -> viscose -> Modal®, Lyocell® -> Cupro® – Spun yarn and filament yarn (synthetic man-made fibres): -> polyester, polyamide (nylon), acrylic, polyurethane, polyethylene -> recycled polyester, recycled polyamide	Continental (or worldwide by default)
		– Amounts and types of materials (including, where relevant, percent recyclate) in the finished primary packaging.						– Production of packaging materials – Forming of packaging materials		Worldwide
Make-up	Make-up	– Country			– Rate of losses per product category	– Electricity consumption for the 2 groups of cloth make-up processes as defined herein*		– Electricity generation – Make-up (infra, water, etc.) excluding energy consumption	Mean consumption figures of the energy mix	National Worldwide

		PCR						IMPACTS BASE		
		Primary data		Specific data		Secondary data				
Stage	**Sub-stage**	**Activity-related data, to be linked to the IMPACTS database inventory data**	**Elementary flows and data without direct links to the IMPACTS database**	**Activity-related data, to be linked to the IMPACTS database inventory data**	**Elementary flows and data without direct links to the IMPACTS database**	**Activity-related data, to be linked to the IMPACTS database inventory data**	**Elementary flows and data without direct links to the IMPACTS database**	**Processes**	**Technical representativeness**	**Geographical representativeness**
Make-up	Coating			– Country		– Electricity consumption** – Rate of losses**		– Electricity generation - Production of coated fabric (production of coatstock and support) excluding energy consumption	Mean consumption figures of the energy mix Coating material (acrylic, polyurethane, PVC and polyester) with different masses per unit area Cloth nappies use products that are coated with from 70 g/m² up to a maximum 150 g/m² of PU or PVC. NB: For PVC coatings, account for the type of VOC treatment	National Worldwide
	Bondings			– Country		– Electricity consumption per unit of weave** – Rate of losses**		– Electricity generation - Production of bonded fabric (production of films and support) excluding energy consumption	Mean consumption figures of the energy mix Bonded films (polyurethane, PES or PTFE)	National Worldwide

		PCR						IMPACTS BASE		
		Primary data		Specific data		Secondary data				
Stage	**Sub-stage**	**Activity-related data, to be linked to the IMPACTS database inventory data**	**Elementary flows and data without direct links to the IMPACTS database**	**Activity-related data, to be linked to the IMPACTS database inventory data**	**Elementary flows and data without direct links to the IMPACTS database**	**Activity-related data, to be linked to the IMPACTS database inventory data**	**Elementary flows and data without direct links to the IMPACTS database**	**Processes**	**Technical representativeness**	**Geographical representativeness**
Make-up of fabrics	Weaving the fabric			– Country – Unit of weave (number of picks per cm and mass per unit area)		– Electricity consumption per unit of weave** – Rate of losses**		– Electricity generation – Weave (infra, water, etc.) excluding energy consumption	Mean consumption figures of the energy mix	National Worldwide
	Knitting the fabric (including knitted lacework)			– Country – Type of knitting		– Rate of losses** – Electricity consumption ('traditional' knitting)**		– Electricity generation – Knitting excluding electricity consumption	Mean consumption figures of the energy mix – Traditional knitting (infra, water, etc.)	National Worldwide
	Sizing			– Country		– Electric power consumption**		– Electricity generation – Sizing excluding electricity consumption	Mean consumption figures of the energy mix	National Worldwide
	Non-woven fabric			– Country		- Electricity consumption** – Rate of losses**		– Electricity generation – Production of non-woven fabric excluding energy consumption	Mean consumption figures of the energy mix	National Worldwide

		PCR						IMPACTS BASE		
		Primary data		Specific data		Secondary data				
Stage	Sub-stage	Activity-related data, to be linked to the IMPACTS database inventory data	Elementary flows and data without direct links to the IMPACTS database	Activity-related data, to be linked to the IMPACTS database inventory data	Elementary flows and data without direct links to the IMPACTS database	Activity-related data, to be linked to the IMPACTS database inventory data	Elementary flows and data without direct links to the IMPACTS database	Processes	Technical representativeness	Geographical representativeness
Finishing	Level 1 (rough)			– Country		– Electricity consumption** (upper-bound value) – Heat energy consumption and type of energy source, if needed (upper-bound value)** – finishing-process consumption (physical value to key in according to process units)		– Electricity generation – Electricity generation – Textile finishing processes to level 1 excluding energy consumption (with upper-bound water consumption figures; mean type and amount of chemicals, WWTP included)	Mean consumption figures of the energy mix 4 types of energy source: coal, biomass, fuel oil and gas – Dyeing – Printing – Composite chemical finish – Mechanical finish	National Europe Worldwide
	Level 2 (moderate)			– Country		– Electricity consumption** (representative value) – Heat energy consumption and type of energy source**, if needed (representative value) – finishing-process consumption (physical value to key in according to process units)		– Electricity generation – Heat generation – Textile finishing processes to level 2 excluding energy consumption, each process differentiated into the 3 WWTP levels (good, moderate/poor, none) (with upper-bound water consumption figures; mean type and amount of chemicals, WWTP included)	Mean consumption figures of the energy mix 4 types of energy source: coal, biomass, fuel oil and gas Each process shall be differentiated into the 3 WWTP—waste water treatment plant—levels – Yarn dyeing – Fabric dyeing – Garment dyeing **and ultimately according to type of material: cotton, polyester blend, etc.** – Discharge printing – Digital printing – Transfer printing – Pigment printing – Stain-repellent – Rain-repellent – Mite-repellent – Anti-microbial – UV-repellent – Micro-encapsulation – Mercerization – Napping – Shearing – Chemical bleaching – Mechanical bleaching – Laser bleaching – Ozone bleaching	National Europe Worldwide

		PCR						IMPACTS BASE		
		Primary data		Specific data		Secondary data				
Stage	**Sub-stage**	**Activity-related data, to be linked to the IMPACTS database inventory data**	**Elementary flows and data without direct links to the IMPACTS database**	**Activity-related data, to be linked to the IMPACTS database inventory data**	**Elementary flows and data without direct links to the IMPACTS database**	**Activity-related data, to be linked to the IMPACTS database inventory data**	**Elementary flows and data without direct links to the IMPACTS database**	**Processes**	**Technical representativeness**	**Geographical representativeness**
Transport	Upstream			- Scenarios on upstream transport (mode of transport and distance travelled)				- Transport-mode processes	– truck – ship – plane	
	Downstream					- Mode of transport – Distance travelled		- Transport-mode processes	– truck – ship – plane	
Use	Machine wash	Mass of laundered layers				– Amount of water, energy, laundry detergent used		– Electricity generation – Production of liquid or powdered detergent – Wastewater treatment – Production of tap water		France France
	Treatment of end-of-life made-up textile-articles							– End-of-life textile waste treatment processes	– Landfilling – Incineration with energy recovery – Incineration without energy recovery – Recycling processes (tbd—the guide does not ask for specifications)	France
	Treatment of production waste							– End-of-life textile waste treatment processes	– 0/100-basis allocation: recycling textile fibre into textile fibre – 50/50-basis allocation: recycling non-textile fibre into textile fibre – Mean inventory	Worldwide
	Treatment of end-of-life packaging waste						Packaging carton recycling rate (the best data available shall be used)	– End-of-life textile waste treatment processes	– Landfilling – Incineration with energy recovery – Incineration without energy recovery – Material recycling	France

Notes to this table:

*Products composed of bamboo viscose and Tencel® could take the data value for “viscose” until such time as the precise data figures are available for these two fibres.

**Activity-stream data expected to be integrated into the ADEME database.

Parameters concerning the usage and nappying kit needs scenario:

The nappying kit needs, in number of products necessary, is calculated to cover a full 24-hours nappy system rotation with one machine-wash every two days (i.e. enough nappying kit to service a full rotation without interruption—including washing/drying products). The impact of product manufacture is divided by the total number of changes that the product is able to serve. This number of changes corresponds to use for two children. In the case of One-Size nappies, the nappying kit needs have to be doubled as the products employed for this one-size-fits-all system have already undergone wear from the first child. This sector-specific guide only concerns mass market products which are therefore home-laundered products.

The manufacturer shall specify the cloth nappy system concerned:

— one of 4 choices possible: Basic cloth nappy or AI1 or AI2 or AI3.

— Composition of the materials used for each system product and the dry weight of each product.

— Sizing principle: “One-Size” nappy or “Sized” nappies

The cloth nappies systems and all 24 possible permutations of nappying kit are given in in **Annex B.**

Impact of manufacture/production over 24 h is calculated as follows:

$$\text{Impact of manufacture (in units of impact)} = \frac{\text{Impact of manuf. 1 product (in units of impact)} \times \text{Number of products necessary}}{\text{Total number of days (5×365)}}$$

Impact of use over 24 h is calculated as follows:

$$\text{Impact of use (in units of impact)} = \frac{\text{Impact of 1 wash of 1 product (in units of impact)} \times \text{Number of products} \times \text{Number of washes/product}}{\text{Total number of days (5×365)}}$$

An illustrative example is set out below:

SCENARIOS:		**Products to account for in each scenario**	Nbr of changes/24 h	Total changes	**Nappying kit needed to serve one full rotation on 2 children (in number of products)**	Number of changes per product for 2 children	Number of washes per product	**IMPACT of Manufacture** over one day (units dependent on impact criterion studied—see sector-specific guide for details)	**IMPACT of use** ratioed to 24 h.
			A	**B**	**C**	**D**	**E**		**G**
1	**Basic cloth nappy**	Cover—Nat Fibres or Blend	5.15	9398.75	12.88	730	127.24	F=[Impact of one product]×C/(5×365)	G=[Impact of one wash of one product]×C×E/(5×365)
		Absorbent nappy	5.15	9398.75	46.35	202.78	203.59	F=[Impact of one product]×C/(5×365)	G=[Impact of one wash of one product]×C×E/(5×365)

Amount of detergent used and wash cycle

The detergent used has effectively been included for accounting here.

This data can be found in **Annex A.**

Electricity consumption:

Tumble-dryer:

Most nappy system manufacturers advise against tumble-drying as it can accelerate product wear-and-tear. The vast majority of products available for retail today are composed of mostly synthetic materials—and tumble-drying accelerates the wear-and-tear of synthetic fabrics. Tumble-drying can only viably be used for fabric products that do not contain elastane, nor elastic, nor waterproof coating, nor Velcro® (i.e. the pads) The tumble-dryer can therefore be used for pads made of natural material (which take longer to dry). In an effort to simplify the calculations and avoid applying a % tumble-dry on just one subcomponent, it has been decided not to account for the tumble-dryer here but to consider a natural line-drying time in indoor conditions at 20℃, which takes longer than tumble-drying. **This choice therefore dictates that the starting nappying supplies have to be increased in number** in order to cover a full rotation of the nappying kit.

Washing machine:

— The average electricity consumption value used here to account for washing the **waterproof parts** (cover, 'absorbent' nappy featuring a waterproof part, and AI1) is **0.172 kWh/kg.**

— The average electricity consumption value used here to account for washing the **absorbent parts** (pad, absorbent nappy, prefolds) is **0.204 kWh/kg.**

— Water consumption of a 3 kg load capacity washing machine is 29.1 litres per wash cycle.

These data are explained and set out in **Annex A.**

9. Data validity over time and update frequency

See General principles for environmental communication on mass market products (Part 0).

10. Validation process for data and results

The information related to drafting the communication that deals with hypotheses, data acquisition methods, the articulation between primary and secondary data, emission factors and assessment limitations shall be made free, transparent and accessible to all, via the appropriate channels (see reports, websites, etc.).

There is no obligation to disclose to a third party any information other than the communication, including the following results in particular (confidential data):

— material composition involved in the composition of the functional unit;

— the manufacturing processes;

— the places of manufacture;

— scrap rates;

— modes of transport;

— nature of the energy consumed;

— the reference flows used;

However, these data must be stored by the manufacturer for organizations in charge of controlling data. For this purpose, the following shall be precisely described and stored:

— the primary data;

— the sources of the secondary data;

— the default values adopted.

The data retention period will be set later.

11. Integrating time-deferred GHG emissions burden

Consequently, it is not relevant to integrate time-deferred GHG emissions burden for this category of products.

12. References

[CYCLECO]: Semi-specific data proposed through the process of putting together the textiles guides v1.2, Cycleco (v1.1 published in October 2011).

[LCA–GP] Life cycle assessment of Hamac®-brand cloth nappies in France – ISO 14040 and 14044 study – June 2012.

[Draft sector-specific guide for “Apparel”]: draft sector-specific guide currently being coordinated by WG5 “Textiles” through the ADEME, 2013.

[UKN] “Life cycle assessment of disposable and reusable nappies in the UK”, Environment Agency, May 2005. The study reports LCA results on disposables and reusables gathered in the UK in 2002–2003.

[UKN8] “An updated lifecycle assessment study for disposable and reusable nappies”, Science Report SC010018/SR2, Environment Agency, October 2008. This study updates the science and results of the previous study.

Annex A

Values for the secondary (or generic) and semi-specific data

A.1. Semi-specific data

Upstream transport

— Model assumptions on the places of manufacture

	Worldwide circuit	**Turkey***	**Euromed**	**Europe**	**France***
Extraction	20,000 km by ship 800 km by truck				
Spinning	Asia / South America	Asia	Asia	Asia	France
Make-up of fabrics	Asia / South America	Asia 25% / Turkey 75%	Asia 25% / Turkey 75% / Europe 30%	Asia 25% / Turkey 75% / Europe 30%	France
Finishing	Asia / South America	Turkey	Asia 25% / Turkey 75% / Europe 50 %	Asia 25% / Turkey 75% / Europe 50 %	France
Make-up	Asia / South America	Turkey	North Africa	Europe	France
Storage	France	France	France	France	France

*In cases where make-up is done in North Africa rather than Turkey, it will be necessary to refer back to the Euromed circuit.

**Provided each step is done in France, otherwise it will be necessary to refer back to the Europe circuit.

— Default transport mode/distance travelled data

	Worldwide circuit (Asia / South America)	**Turkey* circuit**	**Euromed circuit**	**Europe circuit**	**France** circuit**
Extraction / production of fibres – Spinning	20,000 km by ship 800 km by truck				
Spinning – Production of fabrics	Asia / South America → Asia / South America 1,000 km by truck	– 25% Asia →Asia 0.25 × 1,000 km by truck – 75% Asia → Turkey 0.75 × (20,000 km by ship + 800 km by truck)	– 45% Asia →Asia 0.45 × 1,000 km by truck – 25 % Asia → Turkey 0.25 × (20,000 km by ship + 800 km by truck) – 30% Asia → Europe: 0.30 × (20,000 km by ship + 800 km by truck)	– 45% Asia →Asia 0.45 × 1,000 km by truck – 25 % Asia → Turkey 0.25 × (20,000 km by ship + 800 km by truck) – 30% Asia → Europe: 0.30 × (20,000 km by ship + 800 km by truck)	France →France 500 km by truck
Production of fabrics – Finishing	Asia / South America → Asia / South America 1,000 km by truck	– 25 % Asia → Turkey 0.25 × (20,000 km by ship + 800 km by truck) – 75% Turkey →Turkey 0.75 × 1,000 km by truck	– 15 % Asia →Asia 0.15 × 1,000 km by truck – 10 % Asia → Turkey 0.10 × (20,000 km by ship + 800 km by truck) – 25 % Turkey →Turkey 0.25 × 1,000 km by truck – 30% Europe →Europe 0.30 × 1,000 km by truck – 20% Asia → Europe 0.20 × (20,000 km by ship + 800 km by truck)	– 15 % Asia →Asia 0.15 × 1,000 km by truck – 10 % Asia → Turkey 0.10 × (20,000 km by ship + 800 km by truck) – 25 % Turkey →Turkey 0.25 × 1,000 km by truck – 30% Europe →Europe 0.30 × 1,000 km by truck – 20% Asia → Europe 0.20 × (20,000 km by ship + 800 km by truck)	France →France 500 km by truck

	Worldwide circuit (Asia / South America)	Turkey* circuit	Euromed circuit	Europe circuit	France** circuit
Finishing – Make-up	Asia / South America → Asia / South America 1,000 km by truck	Turkey → Turkey 1,000 km by truck	– 15% Asia → North Africa 0.15 × (20,000 km by ship + 800 km by truck) – 35% Turkey → North Africa 0.35 × (3,500 km by ship + 800 km by truck) – 50% Europe → North Africa 0.50 × (2,500 km by ship + 2,000 km by truck)	– 15% Asia → Europe 0.15 × (20,000 km by ship + 800 km by truck) – 35% Turkey → Europe 0.35 × (2,500 km by truck) – 50% Europe →Europe 0.50 × (1,000 km by truck)	France →France 500 km by truck
Make-up – Storage	Asia / South America → France 50% by ship / truck (20,000 km / 800 km) 50% by air / truck (10,000 km / 800 km)	Turkey → France 80% by ship / truck (3,000 km / 2,000 km) 20% by air / truck (3000 km / 1,000 km)	North Africa → France 30 km by ship 2,000 km by truck	Europe → France 2,000 km by truck	France →France 500 km by truck
Recap	30,000 km by ship 4,600 km by truck 5,000 km by air	37,400 km by ship 5,400 km by truck 600 km by air	42,505 km by ship 6,030 km by truck	40,000 km by ship 6,125 km by truck	20,000 km by ship 2,800 km by truck

*In cases where make-up is done in North Africa rather than Turkey, it will be necessary to refer back to the Euromed circuit.

**Provided each step is done in France, otherwise it will be necessary to refer back to the Europe circuit.

Composites, laminates and bondings

— Country of production: Default energy mix proposed in the ADEME database

Make-up

Processes	**Default data values proposed [1]**		**Sources**
Make-up of absorbent parts	Losses (%)	10	[2]
Make-up of pants and covers	Losses (%)	20	[2]

[1] Sector-specific guide on environmental communication for "Jeans" (BIOIS – Levi Strauss & Co, Ober, Marks & Spencers, Apparel Products – 2011)

[2] Environmental impact assessment on textile products (RDC – Redcats, Somewhere – 2010)

Fabric manufacturing (woven, knitted, nonwoven)

— County of manufacture: Default energy mix proposed in the ADEME database

The highest impacts are obtained for high pick count and a low mass-per-surface-area fabrics, hence the default values defined in the table below.

Categories of woven fabrics manufactured for the following articles of wearing apparel:	**Pick count (picks/m)**		**GSM (g/m²)**	
	Standard-practice interval	**Default value**	Standard-practice interval	**Default value**
Absorbent parts	800 to 1,600	**1,600** (i.e. 16 picks/cm)	140 - 400	**140**
Pants and covers	3,100 to 5,000	**5,000** (i.e. 50 picks/cm)	70 - 400	**70**

The following equation can be used to determine unit of weave for a mixed-fabric article *k*, each fabric being characterized by a pick count, a basis weight, and a mass.

(Equation 1)
$$Unit\ of\ weave = \sum_{k=1}^{n} \left(\frac{Pick\ count_k}{Basis\ weight_k} \times Mass_k \right)$$

where:

— Unit of weave: common-denominator unit characterizing all fabrics required to produce the article (picks per m)

— Mass $_k$: mass of fabric *k* required to produce the article (g). This mass figure is calculated from the rates of loss and the mass of fabric *k* incorporated in the article (g) -> primary data

— Pick count $_k$: pick count of fabric *k* (picks per m) -> semi-specific data

— Basis weight $_k$: basis weight of fabric *k* (g/m²) -> semi-specific data

The environmental impact tied to the weaving stage is then determined using equation 2:

(Equation 2) $$Impact\ of\ weaving = Impact\ by\ unit\ of\ weave \times Unit\ of\ weave$$

where:

— Impact of weaving: weaving-stage environmental impact per article (impact)

— Impact by unit of weave: environmental impact per unit of weave (impact/(picks per m) -> secondary data

— Unit of weave: common-denominator unit characterizing all fabrics required to produce the article (picks per m)

Special case of lined garments: 2 options for calculating unit of weave

Option 1: the only known data is total mass of fabric.

In this case, unit of weave can be evaluated using the following equation:

(Equation 3) $$Unit\ of\ weave = \frac{Pick\ count}{Basis\ weight} \times Mass_{total}$$

In this case, account for the total mass of fabric required to produce the article, $_{Mass}$ *total* (in g), which is calculated from the total mass of fabric incorporated in the article—taken as primary data—and the rates of loss. The pick count and GSM values are taken from the table above, under the category headed “Lined garment (overcoat / cloak / jacket /trousers)”.

Option 2: the mass of each fabric incorporated in the article is known (mass of the lining(s) and mass of the core fabric).

In this case, unit of weave is calculated via equation 1 using the pick count and GSM figures given in the table.

Finishing

— Country of production: Default energy mix proposed in the ADEME database

A.2. Secondary (or generic) data

Spinning

— Manufacture of continuous filament in the case of synthetic or man-made fabrics: data (including water consumption and heat-energy mix) integrated under production of the fibres.

Distribution of the wearing apparel

— Mode of transport: by truck

— Distance travelled: > 500 km

NOTE For depots that are outside France, mode of transport and distance travelled to Paris (see clause 8.1) need to be added as primary data.

Use

Machine wash	Current	30℃ 0.39 kWh / cycle 40℃ 0.554 kWh / cycle 60℃ 0.86 kWh / cycle [1] [2] Gentle cycle: the electricity consumption figures given above are halved.
	Water	29.1 L / cycle [2]
	Detergent	115 mL (standard liquid laundry detergent) [3] for a 4 kg-load wash or 75 mL (concentrated liquid laundry detergent) [3] for a 4.5 kg-load wash [4]
	Cycle	3 kg [2]

[1] GfK Retail and Technology, GIFAM GEM Conference, September 2008 and Energy Foundation

[2] Centre Technique de la Teinture et du Nettoyage *www.cttn-iren.com* / Société Française de Chimie - *http://www.sfc.fr/Donnees/mine/soch/texsoch.htm*)

[3] Sector-specific guide on laundry detergents and EC Regulation No. 648/2004

[4] At the discretion the operator responsible for environmental communication

Machine-washing	**Detergent:**	25.5 mL/kg laundry washed with a standard laundry detergent (115 mL for a 4.5-kg machine load) or 16 mL/kg laundry washed with a concentrated laundry detergent (75 mL for a 4.5-kg machine load)
	Water:	29.1 litres/cycle for a 3-kg wash load machine[11]
	Electricity:	Covers, pocket nappies: 0.172 kWh/kg Absorbent parts: 0.204 kWh

[11] ADEME data

Current

	Energy consumption/kg laundry as a function of wash-cycle temperature (based on using a 3 kg load capacity washer-drier)[12]		
	30°	**40°**	**60°**
Medium	0.39/3 = 0.13 kWh/kg	0.554/3 = 0.18 kWh/kg	0.86/3 = 0.29 kWh/kg

Wash-cycle temperature for the non-absorbent parts:

Wash-cycle temperature	**% of parents washing at the target temperature**[13]	**Electricity consumption per cycle (3-kg wash load), kWh/cycle**	**Electricity consumption in kWh/kg**
30℃	26%	0.39	0.130
40℃	72%	0.554	0.185
60℃	2 %	0.86	0.287
Mean electricity consumption			**0.172**

Wash-cycle temperature for the absorbent parts:

Wash-cycle temperature	**% of parents washing at the target temperature**[14]	**Electricity consumption per cycle (3-kg wash load), kWh/cycle**	**Electricity consumption in kWh/kg**
30℃	10%	0.39	0.130
40℃	66%	0.554	0.185
60℃	24%	0.86	0.287
Mean electricity consumption			**0.204**

[12] GfK Retail and Technology, GIFAM GEM Conference, September 2008 and Energy Foundation
[13] [LCA–GP]
[14] [LCA–GP]

Annex B

Data on the amount of products necessary

Table inventorying the 24 possible combinations of cloth nappying supplies needed to serve the functional unit according to nappy system components

Absorbents **Systems**	**Absorbent nappy** (basic cloth nappy) With Nat Fibres or Blend	**Absorbent nappy** (basic cloth nappy) Nat fibres or Blend **One-Size**	**Absorbent pad** (AI1, AI2, AI3) Nat Fibres or Blend	**Absorbent pad**(AI1, AI2, AI3) 100% synthetic	**Absorbent pad** (AI1, AI2, AI3) Nat Fibres or Blend **One-Size**	**Absorbent pad** (AI1, AI2, AI3) 100% synthetic **One-Size**
Cover (for basic cloth nappy) with Nat Fibres or Blend	**Basic cloth nappy**					
Cover (for basic cloth nappy) 100% synthetic	**Basic cloth nappy**					
Cover (for basic cloth nappy) with Nat Fibres or Blend **One-Size**		**Basic cloth nappy**				
Cover (for basic cloth nappy) 100% synthetic **One-Size**		**Basic cloth nappy**				
AI1 nappy With Nat Fibres or Blend			**AI1**	**AI1**		
AI1 nappy 100% synthetic			**AI1**	**AI1**		
AI1 nappy With Nat Fibres or Blend **One-Size**					**AI1**	**AI1**
AI1 nappy 100% synthetic **One-Size**					**AI1**	**AI1**
AI2 cover With Nat Fibres or Blend			**AI2**	**AI2**	**AI2**	**AI2**
AI2 cover 100% synthetic			**AI2**	**AI2**	**AI2**	**AI2**
AI3 cover With Nat Fibres or Blend			**AI3**	**AI3**		
AI3 pad-pouch						
AI3 cover 100% synthetic			**AI3**	**AI3**		
AI3 pad-pouch						

Summary table recapping all 24 possible permutations of nappying kit systems and components

		Sized nappies			One-Size nappies	
SCENARIOS:		Outer part: (Cover, AI1, AI2, AI3)	ASORBENT: (Absorbent nappy, Pad)	Pad-pouch: (AI3)	Outer part: (Cover, AI1, AI2, AI3)	ASORBENT: (Absorbent nappy, Pad)
1	Basic cloth nappy	Nat Fibres or Blend	Nat Fibres or Blend			
2	Basic cloth nappy	100% synthetic	Nat Fibres or Blend			
3	Basic cloth nappy				Nat Fibres or Blend	Nat Fibres or Blend
4	Basic cloth nappy				100% synthetic	Nat Fibres or Blend
5	AI1 nappy	Nat Fibres or Blend	Nat Fibres or Blend			
6	AI1 nappy	Nat Fibres or Blend	100% synthetic			
7	AI1 nappy	100% synthetic	Nat Fibres or Blend			
8	AI1 nappy	100% synthetic	100% synthetic			
9	AI1 nappy				Nat Fibres or Blend	Nat Fibres or Blend
10	AI1 nappy				Nat Fibres or Blend	100% synthetic
11	AI1 nappy				100% synthetic	Nat Fibres or Blend
12	AI1 nappy				100% synthetic	100% synthetic
13	AI2 nappy	Nat Fibres or Blend	Nat Fibres or Blend			
14	AI2 nappy	Nat Fibres or Blend	100% synthetic			
15	AI2 nappy	100% synthetic	Nat Fibres or Blend			
16	AI2 nappy	100% synthetic	100% synthetic			
17	AI2 nappy				Nat Fibres or Blend	Nat Fibres or Blend
18	AI2 nappy				Nat Fibres or Blend	100% synthetic
19	AI2 nappy				100% synthetic	Nat Fibres or Blend
20	AI2 nappy				100% synthetic	100% synthetic
21	AI3 nappy	Nat Fibres or Blend	Nat Fibres or Blend	100% synthetic		
22	AI3 nappy	Nat Fibres or Blend	100% synthetic	100% synthetic		
23	AI3 nappy	100% synthetic	Nat Fibres or Blend	100% synthetic		
24	AI3 nappy	100% synthetic	100% synthetic	100% synthetic		

Product drying times

number of days	number of hours*	Nappy components
0.08	2	100%-synthetic cover, AI3 pouch
0.21	5	100%-synthetic pad, synthetic AI3 cover
0.29	7	Synthetic AI2 cover, Synthetic AI1 cover
0.50	12	Natural-fibre or blend cover, Natural-fibre or blend AI2 cover, Natural-fibre or blend AI3 cover
1.00	24	Absorbent nappy, Natural-fibre or blend AI1 cover, Natural-fibre or blend pad

**Drying times measured on products after one wash-and-spin-dry cycle. Drying time = time it takes for the weight of 'wet' product taken out of the washing machine to fall back down to the weight of the dry product. (Source: Génération Plume)*

Frequency of washing: For the absorbent nappies and absorbents: 1 wash every 2 days.[15]

Starting cloth nappies kit: components and accessories needed to cover a full nappy system rotation on two children with one machine-wash every two days:

[15] Source [UKN], [UKN8] and [LCA–GP]

	Components			REFERENCE FLOWS per scenario												
SCENARIOS:	**Outer part: (Cover, AI1, AI2, AI3)**	**ASORBENT: (Absorbent nappy, Pad)**	**Pad-pouch: (AI3)**	**Components to account for in each scenario**	Total duration for 2 children (in years)	Nbr of changes/day	Total changes for 2 children	Frequency of washing (in Nbr of days)	Wash every *x* changes	Products washed per machine load	Drying time, in days	Total products necessary per size	Number of sizes	**Nappying kit necessary**	Use per nappy on 2 children	Number of washes per product*
Basic cloth nappy	Nat Fibres or Blend	Nat Fibres or Blend		Cover—Nat Fibres or Blend	**5**	5.15	9,398.75	2	6	1.72	0.5	4.29	3	**12.88**	730.00	121.67
				Absorbent nappy	**5**	5.15	9,398.75	2	1	10.30	1	15.45	3	**46.35**	202.78	202.78
Basic cloth nappy	100% synthetic	Nat Fibres or Blend		Cover—100% synthetic	**5**	5.15	9,398.75	2	6	1.72	0.08	2.13	3	**6.39**	1,471.77	245.30
				Absorbent nappy	**5**	5.15	9,398.75	2	1	10.30	1	15.45	3	**46.35**	202.78	202.78
Basic cloth nappy (One-Size)	Nat Fibres or Blend	Nat Fibres or Blend		Cover—Nat Fibres or Blend	**5**	5.15	9,398.75	2	6	1.72	0.5	4.29	1	**8.58**	1,095.00	182.50
				Absorbent nappy	**5**	5.15	9,398.75	2	1	10.30	1	15.45	1	**30.90**	304.17	304.17
Basic cloth nappy (One-Size)	100% synthetic	Nat Fibres or Blend		Cover—100% synthetic	**5**	5.15	9,398.75	2	6	1.72	0.08	2.13	1	**4.26**	2,207.66	367.94
				Absorbent nappy	**5**	5.15	9,398.75	2	1	10.30	1	15.45	1	**30.90**	304.17	304.17
AI1 nappy	Nat Fibres or Blend	Nat Fibres or Blend		AI1 nappy Nat Fibres or Blend	**5**	5.15	9,398.75	2	1	10.30	1	15.45	3	**46.35**	202.78	202.78
				Pad Nat Fibres or Blend	**5**	5.15	9,398.75	2	1	10.30	1	15.45	2	**30.90**	304.17	304.17
AI1 nappy	Nat Fibres or Blend	100% synthetic		AI1 nappy Nat Fibres or Blend	**5**	5.15	9,398.75	2	1	10.30	1	15.45	3	**46.35**	202.78	202.78
				Absorbent pad—Synthetic	**5**	5.15	9,398.75	2	1	10.30	0.21	11.38	2	**22.76**	412.90	412.90
AI1 nappy	100% synthetic	Nat Fibres or Blend		AI1 nappy—Synthetic	**5**	5.15	9,398.75	2	1	10.30	0.29	11.79	3	**35.38**	265.65	265.65
				Pad—Nat Fibres or Blend	**5**	5.15	9,398.75	2	1	10.30	1	15.45	2	**30.90**	304.17	304.17
AI1 nappy	100% synthetic	100% synthetic		AI1 nappy—Synthetic	**5**	5.15	9,398.75	2	1	10.30	0.29	11.79	3	**35.38**	265.65	265.65

	Components			REFERENCE FLOWS per scenario												
SCENARIOS:	**Outer part: (Cover, AI1, AI2, AI3)**	**ASORBENT: (Absorbent nappy, Pad)**	**Pad-pouch: (AI3)**	**Components to account for in each scenario**	Total duration for 2 children (in years)	Nbr of changes/day	Total changes for 2 children	Frequency of washing (in Nbr of days)	Wash every *x* changes	Products washed per machine load	Drying time, in days	Total products necessary per size	Number of sizes	**Nappying kit necessary**	Use per nappy on 2 children	Number of washes per product*
				Absorbent pad—Synthetic	**5**	5.15	9,398.75	2	1	10.30	0.21	11.38	2	**22.76**	412.90	412.90
AI1 nappy	Nat Fibres or Blend	Nat Fibres or Blend		AI1nappy Nat Fibres or Blend	**5**	5.15	9,398.75	2	1	10.30	1	15.45	1	**30.90**	304.17	304.17
(One-Size)				Pad Nat Fibres or Blend	**5**	5.15	9,398.75	2	1	10.30	1	15.45	1	**30.90**	304.17	304.17
AI1 nappy	Nat Fibres or Blend	100% synthetic		AI1 nappy Nat Fibres or Blend	**5**	5.15	9,398.75	2	1	10.30	1	15.45	1	**30.90**	304.17	304.17
(One-Size)				Absorbent pad—Synthetic	**5**	5.15	9,398.75	2	1	10.30	0.21	11.38	1	**22.76**	412.90	412.90
AI1 nappy	100% synthetic	Nat Fibres or Blend		AI1 nappy—Synthetic	**5**	5.15	9,398.75	2	1	10.30	0.29	11.79	1	**23.59**	398.47	398.47
(One-Size)				Pad—Nat fibres or Blend	**5**	5.15	9,398.75	2	1	10.30	1	15.45	1	**30.90**	304.17	304.17
AI1 nappy	100% synthetic	100% synthetic		AI1 nappy—Synthetic	**5**	5.15	9,398.75	2	1	10.30	0.29	11.79	1	**23.59**	398.47	398.47
(One-Size)				Absorbent pad—Synthetic	**5**	5.15	9,398.75	2	1	10.30	0.21	11.38	1	**22.76**	412.90	412.90
AI2 nappy	Nat Fibres or Blend	Nat Fibres or Blend		AI2 Cover—Nat fibres or Blend	**5**	5.15	9,398.75	2	3	3.43	0.5	6.01	3	**18.03**	521.43	173.81
				Pad—Nat fibres or Blend	**5**	5.15	9,398.75	2	1	10.30	1	15.45	2	**30.90**	304.17	304.17
AI2 nappy	Nat Fibres or Blend	100% synthetic		AI2 Cover—Nat fibres or Blend	**5**	5.15	9,398.75	2	3	3.43	0.5	6.01	3	**18.03**	521.43	173.81
				Absorbentpad—Synthetic	**5**	5.15	9,398.75	2	1	10.30	0.21	11.38	2	**22.76**	412.90	412.90
AI2 nappy	100% synthetic	Nat Fibres or Blend		AI2 cover—100% synthetic	**5**	5.15	9,398.75	2	3	3.43	0.29	4.93	3	**14.78**	635.89	211.96

	Components			REFERENCE FLOWS per scenario												
SCENARIOS:	**Outer part: (Cover, AI1, AI2, AI3)**	**ASORBENT: (Absorbent nappy, Pad)**	**Pad-pouch: (AI3)**	**Components to account for in each scenario**	Total duration for 2 children (in years)	Nbr of changes/day	Total changes for 2 children	Frequency of washing (in Nbr of days)	Wash every *x* changes	Products washed per machine load	Drying time, in days	Total products necessary per size	Number of sizes	**Nappying kit necessary**	Use per nappy on 2 children	Number of washes per product*
				pad—Nat fibres or Blend	**5**	5.15	9,398.75	2	1	10.30	1	15.45	2	**30.90**	304.17	304.17
AI2 nappy	100% synthetic	100% synthetic		AI2 cover—100% synthetic	**5**	5.15	9,398.75	2	3	3.43	0.29	4.93	3	**14.78**	635.89	211.96
				Absorbent pad—Synthetic	**5**	5.15	9,398.75	2	1	10.30	0.21	11.38	2	**22.76**	412.90	412.90
AI2 nappy	Nat Fibres or Blend	Nat Fibres or Blend		AI2 Cover—Nat fibres or Blend	**5**	5.15	9,398.75	2	3	3.43	0.5	6.01	1	**12.02**	782.14	260.71
(One-Size)				Pad—Nat fibres or Blend	**5**	5.15	9,398.75	2	1	10.30	1	15.45	1	**30.90**	304.17	304.17
AI2 nappy	Nat Fibres or Blend	100% synthetic		AI2 Cover—Nat fibres or Blend	**5**	5.15	9,398.75	2	3	3.43	0.5	6.01	1	**12.02**	782.14	260.71
(One-Size)				Absorbent Pad—Synthetic	**5**	5.15	9,398.75	2	1	10.30	0.21	11.38	1	**22.76**	412.90	412.90
AI2 nappy	100% synthetic	Nat Fibres or Blend		AI2 cover—100% synthetic	**5**	5.15	9,398.75	2	3	3.43	0.29	4.93	1	**9.85**	953.83	317.94
(One-Size)				Pad—Nat fibres or Blend	**5**	5.15	9,398.75	2	1	10.30	1	15.45	1	**30.90**	304.17	304.17
AI2 nappy	100% synthetic	100% synthetic		AI2 cover—100% synthetic	**5**	5.15	9,398.75	2	3	3.43	0.29	4.93	1	**9.85**	953.83	317.94
(One-Size)				Absorbent Pad—Synthetic	**5**	5.15	9,398.75	2	1	10.30	0.21	11.38	1	**22.76**	412.90	412.90
AI3 nappy	Nat Fibres or Blend	Nat Fibres or Blend	100% synthetic	AI3 Cover—Nat Fibres or Blend	**5**	5.15	9,398.75	2	7	1.47	0.5	4.05	3	**12.14**	774.24	110.61
				Pad Nat Fibres or Blend	**5**	5.15	9,398.75	2	1	10.30	1	15.45	2	**30.90**	304.17	304.17
				AI3 pouch	**5**	5.15	9,398.75	2	**3**	3.43	0.08	3.85	3	11.54	814.73	271.58

	Components			REFERENCE FLOWS per scenario												
SCENARIOS:	**Outer part: (Cover, AI1, AI2, AI3)**	**ASORBENT: (Absorbent nappy, Pad)**	**Pad-pouch: (AI3)**	**Components to account for in each scenario**	Total duration for 2 children (in years)	Nbr of changes/day	Total changes for 2 children	Frequency of washing (in Nbr of days)	Wash every *x* changes	Products washed per machine load	Drying time, in days	Total products necessary per size	Number of sizes	**Nappying kit necessary**	Use per nappy on 2 children	Number of washes per product*
AI3 nappy	Nat Fibres or Blend	100% synthetic	100% synthetic	AI3 Cover—Nat Fibres or Blend	**5**	5.15	9,398.75	2	7	1.47	0.5	4.05	3	**12.14**	774.24	110.61
				Absorbent pad—Synthetic	**5**	5.15	9,398.75	2	1	10.30	0.21	11.38	2	**22.76**	412.90	412.90
				AI3 pouch	**5**	5.15	9,398.75	2	**3**	3.43	0.08	3.85	3	11.54	814.73	271.58
AI3 nappy	100% synthetic	Nat Fibres or Blend	100% synthetic	AI3 Cover—Synthetic	**5**	5.15	9,398.75	2	7	1.47	0.21	2.55	3	**7.66**	1,227.19	175.31
				Pad—Nat fibres or Blend	**5**	5.15	9,398.75	2	1	10.30	1	15.45	2	**30.90**	304.17	304.17
				AI3 pouch	**5**	5.15	9,398.75	2	**3**	3.43	0.08	3.85	3	11.54	814.73	271.58
AI3 nappy	100% synthetic	100% synthetic	100% synthetic	AI3 Cover—Synthetic	**5**	5.15	9,398.75	2	7	1.47	0.21	2.55	3	**7.66**	1,227.19	175.31
				Absorbent pad—Synthetic	**5**	5.15	9,398.75	2	1	10.30	0.21	11.38	2	**22.76**	412.90	412.90
				AI3 pouch	**5**	5.15	9,398.75	2	**3**	3.43	0.08	3.85	3	11.54	814.73	271.58

***The number of washes obtained per product is coherent with the market research figures recorded for home-laundered nappy system use and validated by the WG 4H experts.**

Annex C

Criteria grid

	Greenhouse gas emissions	Acidification	Ozone layer depletion	Terrestrial ecotoxicity	Depletion of abiotic resources	Eutrophication	Photochemical oxidant formation	Aquatic toxicity	Human toxicity	Resource depletion, water (proxied using water consumption)
Relevance										
Evaluation of an environmental issue in the product category and attributable to product	Compulsory	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Importance of the issue	++	++	+	No data	+++ Issue rates as important according to the norming calculations	++	++	+++ Issue rates as important according to the norming calculations	++	++++ Issue rates as very important according to the norming calculations
Differentiation for a majority of products on the market (comparability)	Options for differentiation on place of production and energy consumption levels.	Options for differentiation on place of production and energy consumption levels.			Options for differentiation on place of production and energy consumption levels.	Options for differentiation on materials used		Options for differentiation on materials used	Options for differentiation on materials used.	
Redundancy with other indicators		Partially redundant with the "greenhouse gas emissions" indicator.	Partially redundant with the "greenhouse gas emissions" indicator.							
Makes it possible to highlight eco-design opportunities	Optimization of the manufacturing processes—especially to leverage		Optimization of the manufacturing processes.	Type of materials	Type and weight of materials	Process Optimization on Choice and weight of		Type of materials	Type of materials	Optimization of the manufacturing processes

	Greenhouse gas emissions	Acidification	Ozone layer depletion	Terrestrial ecotoxicity	Depletion of abiotic resources	Eutrophication	Photochemical oxidant formation	Aquatic toxicity	Human toxicity	Resource depletion, water (proxied using water consumption)
	energy efficiency.					materials				
Implementation, feasibility										
Possibility/implementability for the database	IPCC 2007	ReCiPe 2008	EDIP 97 (2004)	USETOX	EDIP 97 (2004)	ReCiPe 2008	CML 2002	USETOX/CML 2002	USETOX	
Accessibility to primary data required for the firm to characterize the indicator	Energy consumption rates and types of transport used	Energy consumption rates, types of distribution-stage transport used			Energy consumption rates, types of distribution-stage transport used	Type of transport, source countries of the textile fabrics				Production-stage and use-stage water consumption
Consistency										
Consistency with the recommendations of the ADEME/AFNOR platform (general platform, methodology WG, sector-specific WGs)	Yes	Yes		Needs arbitration from the platform	Yes	Yes	Yes	Needs arbitration from the platform	Needs arbitration from the platform	
Life cycle scope	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product–packaging scope	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Consistency with other indicators displayed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Robustness, reliability										
Scientific and international recognition	Featured in the ILCD handbook	Featured in the ILCD handbook	Featured in the ILCD handbook	Featured in the ILCD handbook	Featured in the ILCD handbook	Featured in the ILCD handbook	Featured in the ILCD handbook	Featured in the ILCD handbook	Featured in the ILCD handbook	Not featured in the ILCD handbook

	Greenhouse gas emissions	Acidification	Ozone layer depletion	Terrestrial ecotoxicity	Depletion of abiotic resources	Eutrophication	Photochemical oxidant formation	Aquatic toxicity	Human toxicity	Resource depletion, water (proxied using water consumption)
Methodological robustness	IPCC 2007 Consensus-built method ILCD class-I	ReCiPe 2008 Consensus-built method ILCD class-II	EDIP 97 (2004) ILCD class-I	USETOX ILCD class-II/III	EDIP 97 (2004) ILCD class-II	ReCiPe 2008 Consensus-built method ILCD class-II	CML 2002 Consensus-built method ILCD class-II	USETOX ILCD class-II/III	CML 2002 ILCD class-II/III	
Reliability of the modelling component (computation rule)	++	+			+	+				
Expected reliability of primary data	Good on the country of production Moderate on electricity consumption	Good on the country of production Moderate on electricity consumption	Good on the country of production Moderate on electricity consumption	Good on the country of production Moderate on electricity consumption	Good on the country of production Moderate on electricity consumption	Good on the country of production Moderate on electricity consumption	Good on the country of production Moderate on electricity consumption	Good on the country of production	Good on the country of production Moderate on electricity consumption	
Reliability of available secondary data										
Indicator selected? (Yes / No)	Yes				Yes					Yes

The following indicators were unable to be studied here:

- Particulate matter/Respiratory inorganics
- Ionising radiation, human health
- Eutrophication, terrestrial
- Ionising radiation, ecosystems
- Land and soil change

List of the organizations involved in the follow-up, drafting and/or making of this guide

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