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Green Feeding – climate action from birth

Summary

In this advocacy document the authors aim to show how the subject of Green Feeding of infants and young children can support the growing worldwide movement for climate action by school children, parents and the public. At the same time, we aim to further the policy initiatives of Green parties and political parties with green priorities.

Part I defines Green Feeding and provides the rationale for the inclusion of Green Feeding in policies and programmes.

Part II provides examples of specific actions to be taken at individual, community, regional and country levels, presented as separate modules that can be selected according to priorities¹.

Part III suggests how these actions can build on the results of national assessments in the World Breastfeeding Trends initiative (WBTi) and **provides information** on the *WBTi* participatory process.

Part IV gives references and includes resources in languages other than English.

About this advocacy document

This advocacy document is the result of a collaborative effort by Penny van Esterik and Alison Linnear with the assistance of Britta Boutry-Stadelmann and Rebecca Norton. We have all benefitted from on-going discussions with breastfeeding and climate change activists, but these are not official publications which have been reviewed and approved by all interested parties. They are intended as starting points to encourage other individuals and groups to integrate Green Feeding into their ongoing advocacy work on climate change.

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¹ Examples are based on the list of ten priorities in the Europe Green 10 NGO 2019 manifesto : [Green 10 NGO Manifesto for Europe](#)

I. Definition of Green Feeding and its rationale

What is Green Feeding ?²

Green Feeding describes **optimal and sustainable** breastfeeding and complementary feeding practices for infants and young children aged from 0-36 months.

Such optimal infant and young child feeding practices protect the health of infants, young children and their mothers, as well as the environment of our planet – Mother Earth.

Often people feel that climate change caused by global warming is such an immense problem that there is nothing that individuals can do about it. But each and every one of us was nurtured as a baby by being fed breastmilk or with a substitute based on cow's milk. Everyone can thus relate to infant and young child feeding practices - and can learn how to make these practices environmentally friendly. The school children's movement in many countries shows us how collective action can help us all fight climate change. In this way, Green Feeding becomes a basic transformative change that contributes to a healthier population and a healthier planet.

Optimal infant and young child feeding for survival, health and development

The [World Health Organization](#), WHO, (1) in 2015 issued public health recommendations to define the term 'optimal'. WHO states that infants should receive only breastmilk for the first six months of life, followed by the addition of appropriate, adequate and safe complementary foods with continued breastfeeding until two years of age or beyond. Breastmilk substitutes are designed to replace or supplement breastmilk ; they include infant formulas, specialty and follow up formulas as well as growing up or toddler milks.

The 2018 WHO and UNICEF Information Note (2) provides [Clarification on the classification of follow up formulas for infants 6-36 months as breastmilk substitutes](#). Therefore, these follow up formulas, including toddler and growing up milks in powdered or liquid form, are covered by strict controls on marketing and labelling, as required by the International Code of Marketing of Breast-milk Substitutes and subsequent, relevant Resolutions of the World Health Assembly, the highest policy-setting body in the field of international public health.

In 2013, WHO had already stated clearly in their [Brief on follow up formulas and the Code](#) (3) that these products for use after the first six months are unnecessary as well as unsuitable. In 2013, the [European Food Safety Authority](#), EFSA, (4) found that follow up milks provided no additional value for children who already ate a balanced diet, and identified "no unique role" for growing-up and young-child formulas for young children aged 1-3.

Sustainable infant and young child feeding for our planet

Breastmilk is a renewable natural resource which is often neglected in discussions about sustainable food production, environmental degradation and climate change. Breastfeeding is the most economical and environmentally friendly way to feed an infant and young child, producing zero garbage, minimal greenhouse gases (GHG), and tiny water footprint. The extra calories needed by a breastfeeding mother may be provided by many different foods. Because these foods emit varying levels of greenhouse gases, depending on production methods, they should be calculated for the national and local context. A diet of beefsteak and full-fat processed cheese has a larger carbon footprint than a diet of cereals, pulses and low-fat cheese. The few extra

² Green Feeding is also referred to as GreenFeeding.

litres of water required by a breastfeeding mother are negligible compared to the amounts of water for formula production and preparation.

Unlike breastfeeding, factory-produced baby milks and foods place a heavy burden on our planet and on its environment and ecosystems, as well as on our health and our economy. This burden is caused by industrial dairy farming for milk production, milk processing and formula manufacturing, transport and packaging. These ultra-processed products leave a large carbon footprint, a large water footprint and a huge pile of waste for disposal.

Continued breastfeeding or infant formula feeding is complemented after six months by adding adequate amounts of safe and nutritious solid or semi-solid foods, locally produced by sustainable agriculture. The Green Feeding choice is to use such home-prepared foods and culturally appropriate complementary foods.

These family foods contrast with the industrially produced and ultra-processed foods, with high levels of sugar and fats and some toxic chemicals. All such processed, packaged and transported foods are unsustainable, but all of them are heavily promoted by advertising and marketing methods which can undermine optimal and sustainable breastfeeding and complementary feeding.

Why do we need Green Feeding?

In 2016, the respected medical journal [The Lancet](#) (5) published a series on breastfeeding in the 21st century. The Lancet examined the cogent reasons for investing in breastfeeding, and for the first time, included its environmental impact (6) : [Why invest, and what will it take to improve breastfeeding practices ?](#)

The environmental costs of not breastfeeding, page 499

"Although not yet quantifiable in monetary terms, environmental costs are also associated with not breastfeeding. Breastmilk is a 'natural, renewable food' that is environmentally safe and produced and delivered to the consumer without pollution, unnecessary packaging, or waste. By contrast, breastmilk substitutes leave an ecological footprint and need energy to manufacture, materials for packaging, fuel for transport distribution, and water, fuel, and cleaning agents for daily preparation and use, and numerous pollutants are generated across this pathway. More than 4000 l. of water are estimated to be needed along the production pathway to produce just 1 kg of breastmilk-substitute powder. In the USA, 550 million cans, 86 000 tons of metal, and 364 000 tons of paper, annually used to package the product, end up in landfills."

It is evident that the protection, promotion and support of breastfeeding has a significant impact on mitigating harm to health, environment and economies. Yet despite the growing evidence of the value of breastfeeding, it is not high on the political agenda. Few governments and policy makers acknowledge this contribution made by women, and fail to make the protection, promotion and support of breastfeeding a priority in setting policy and programmes.

Conversely, it is urgent to adopt, implement and monitor Green Feeding policies to counter the powerful influence of aggressive advertising and intensive promotions of industrial products. This advocacy document therefore aims to provide arguments and evidence to convince decision- and policy-makers to recognise and value the unique contribution of women to environmentally sustainable infant feeding. Communities, governments and society at large all have a vital role to play in implementing concrete actions to support mothers and their families at the very start of their child's life. But as the school children are showing us, we all have to

work together to make changes – Green Feeding from birth is the very first step in the right direction.

Climate-smart development goals for all countries

To counter the ever-accelerating impact of climate change, the policy platforms of the green movement and the greens³ already prioritise environmental sustainability, protection of biodiversity and reduction in global warming. However, there is little mention of food production and consumption. Green Feeding is thus a practical way to inform decision-makers, communities and households on action they can take to fight climate change at national, local and individual levels.

"Breastfeeding and human milk's contribution to environmental sustainability and food security year-round should be considered in climate-smart development goals at national and global levels." The Lancet (2016). Why invest, and what will it take to improve breastfeeding practices ? (6)

Why is it urgent to adopt Green Feeding policies?

Expansion of the market for baby milks and foods

Breastmilk substitutes are any products used to replace or supplement human milk. They include infant formulas, specialty formulas, follow up milks, toddler or growing up milks, and milk-based cereal foods. The authors of the 2015 report [Carbon Footprint due to Milk Formula](#) (7) show that many of these ultra-processed products, particularly those directed at toddlers, have no proven health benefits and are even more damaging to the environment than infant formulas designed for newborns.

This market is growing rapidly and thus has substantial negative consequences for individuals, households and the planet. "The retail value of the formula industry is growing. Unlike other commodities, baby milk formula seems to be resilient to market downturns. In 2014, global sales of all baby milk formula were about US\$ 44.8 billion – by 2019, the market value is projected to reach US\$ 70.66 billion." (6). By 2021, according to [The Statistics Portal](#), (8) this market is projected to grow further to about 76 billion USD. The 2017 Technavio research report [Global Baby Food and Infant Formula Market 2017-2021](#) (9) includes baby foods and thus provides in-depth analysis of the market in terms of revenue and emerging market trends. Technavio analysts forecast the market to grow to USD 102.29 billion by 2021, at a CAGR of close to 9% over the forecast period.

These figures are even more significant when every young child on our planet is taken into account. The authors of [Global trends and patterns of commercial milk-based formula sales](#) (10) note that, whereas there are only "stable trends in global exclusive breastfeeding measures, the total world milk-based formula sales volume grew from 5.5 to 7.8 kg per infant/child in the period 2008-2013. **This figure is projected to increase to 10.8 kg per infant/child by 2018.**" (emphasis added).

³ For the purposes of this advocacy document, the general term 'the greens' is used to include both Green parties and Political parties with green priorities.

Baby milks and foods are manufactured on an industrial scale, and are exported or imported world-wide. Manufacturers use aggressive advertising and intensive promotion to create new markets for breastmilk substitutes and to expand their market share. Each additional kilo of these products for feeding babies and toddlers means an increase in areas of land cleared and used for industrial dairy farming, in exploitation of scarce natural resources such as fuel, energy and water, and in environmental pollution. All of these are caused by industrial dairy farming, factory processing and transport. Furthermore, each additional kilo means a reduction in the protective effects of breastfeeding.

Breastfeeding – long-lasting, wide-ranging, far-reaching protection

Breastfeeding mothers are safeguarding their own and their children's health. At the same time they contribute to safeguarding the health of our planet and the health of the economy. Breastfeeding brings financial savings to countries on the cost of imports of formula and baby foods and savings to families on the costs of expensive products, as well as providing substantial savings on health care at hospital and family level.

Long-lasting protection

Breastfeeding when initiated early, practised exclusively for six months and continued until babies are two years of age or older, provides, as explained in [WHO's 2018 Key Facts](#) (11) substantial health protection for mothers and children. "To meet the infant's immunological needs, breastfeeding delivers unique anti-microbial, anti-inflammatory, immuno-regulatory agents and living leukocytes through human milk and colostrum." (59 : Van Esterik P, O'Connor R. 2017). The comparative table [What's in Breastmilk](#) (12) provides a summary of these vital components : hormones, stem cells, Human Milk Oligosaccharides, mi-RNA epigenetic messengers, all of which are present in breastmilk, and compares them to their absence in formula.

These anti-infective agents and live cells ensure survival and healthy development of infants in the short term. The [2018 WHO and UNICEF Clarification](#) (2) issues the alert that worldwide those "children who are not breastfed at 12-23 months of age are about twice as likely to die as those who are breastfed in this second year of life." Mothers who breastfeed have reduced risk of breast and ovarian cancer, while "Continued breastfeeding delays the return of fertility, contributing to longer birth intervals in the absence of contraceptive use."

In the longer term breastfeeding protects against childhood overweight and reduces the risk of obesity and non-communicable diseases in later life such as certain cancers and diabetes. The 2019 WHO European study on the [Association between Characteristics at Birth, Breastfeeding and Obesity](#) (71) found that breastfeeding can reduce the risk of child obesity by 25%.

Wide-ranging protection

Breastfeeding is not only a private matter between a mother and her baby : how a mother feeds her baby also affects our planet and its climate. Support for mothers to breastfeed helps mitigate the harm caused to our environment by contributing to reduce Greenhouse Gases (GHG), by conserving water, and by producing no waste. This holds true in all countries of the world, industrialised or developing. It is an unacknowledged and under-valued contribution that women make to reduce the impacts of man-made climate change in households and communities worldwide.

Far-reaching protection

Policy initiatives on healthy local sustainable food production and food security often ignore the fact that breastmilk is a natural renewable food, and that breastfeeding contributes substantially to food and water security for infants and young children. Breastfeeding offers a safe food source for infants, and contributes to the empowerment of women in their unique role of motherhood. Support for breastfeeding with the addition of nutritious locally produced foods favours sustainable agricultural production and decreases the use of precious water and natural resources, especially in the many countries where global warming caused by climate change is increasing pressure on these resources. Breastfeeding is vital for survival in the emergency and relief situations caused by global climate change and in the context of pandemia, it helps mitigate the severity of impacts on vulnerable populations of climate-related disasters.

At the level of national and household economies, breastfeeding saves money on the import and purchase of expensive baby milks and foods such as milk-based formulas and cereals for infants and young children. Breastfeeding reduces diseases and disabilities caused by over- and under-nutrition. The consequent improvements in maternal and child health reduce the costs of health care for families, communities and nations. This in turn saves costs incurred for the production, packaging, transportation and disposal of medicines and other medical equipment and treatments.

II. Priority actions for people and the planet

On May 1st 2019, the UK Parliament declared a ‘Climate Emergency’, emphasising the urgent need to mitigate the impact of climate change caused by global warming. We must all work together at every level from personal to community to political to take action to :

1. Reduce emissions of Green House Gases (GHG)

1.1 Reduce Carbon dioxide (CO₂-eq.) emissions

The 2019 peer-reviewed study [The carbon footprint of breastmilk substitute in comparison with breastfeeding](#) (72) indicates that "breastfeeding has a consistently lower carbon footprint than using breastmilk substitutes." The results confirm those of the 2015 study in six countries in Asia which estimated the GHG emissions attributable to baby milk formula. This Report on [Carbon Footprint due to Milk Formula](#) (7) provides methods for calculations and tables of results, using the [measure called carbon dioxide equivalent \(CO₂-eq\)](#) in the OECD Glossary (13) to compare the emissions from various greenhouse gases based on their global warming potential.

In the six countries studied in Asia, the total estimated greenhouse gas emissions of 2.89 million tonnes of CO₂-eq. due to milk formula equals these figures for annual GHG emissions. These were calculated using the US GHG calculator for equivalent activities: metric numbers have been added to this summary of the Report’s conclusions :

- the 11,083 million kms/6,888.1 million miles driven by an average passenger vehicle ;
- the 1.03 million tonnes (one tonne = one thousand kilos) of waste sent to landfill sites ;
- the CO₂-eq emissions from 1,232 million litres/325.5 million gallons of gasoline consumed or 1,409.5 million kilos/3,107.4 million pounds of coal burned.

The authors conclude : **"These CO₂ emissions are equivalent to the annual carbon sequestered by 74.1 million tree seedlings grown for 10 years, or 9307.8 million sq.km./2.3 million acres of US forests in one year."**

These figures become still clearer when the GHG emissions **per kilo** of baby milk formulas are calculated, even without the inclusion of all the post-manufacturing stages. The 2016 article [The carbon footprint of infant milk formula](#) (14) explains:

"The study calculations showed that the GHG emission for a kilogram of milk formula (including standard infant formula, follow up formula and toddler milk), was around 4kg CO₂.eq. This excluded emissions after the manufacturing stage, such as those arising due to packaging, transport, preparation and refrigeration of milk formula products."

In 2018, **10 Asian countries updated their initial findings from 2015** by comparing milk formula sales in 2016 with projected sales in 2021, and the corresponding increases in GHG emissions. The 2018 report on [Milk Formula Sales and GHG Emissions in 10 countries](#) (15) showed, for example, that in Indonesia in 2016 sales were 287.2 thousand tonnes, whereas in 2021 they are forecast to be 340.1 thousand tonnes. In consequence, GHG emissions will increase from 1,156.91 thousand tonnes to 1,370.47 thousand tonnes of CO₂-eq. In Vietnam, the increase is even greater. By contrast, in India the increase is greatly reduced; India has a policy of protecting, promoting and supporting breastfeeding and a strong law to limit marketing of breastmilk substitutes which is enforced and monitored. For further details, see reference list with links to the 10 Asian country reports in annex 2, and the summary in the article published by Science Alert [No One is talking about the environmental impacts of the baby formula industry](#) (16). However, the publishers of this article published a Disclaimer at a later date, stating that the publication was "in no way saying that parents shouldn't formula feed or that it's a bad choice." On the other hand, parents have every right to receive information free from vested commercial interests. This right to informed decision-making means knowing about all the advantages of breastfeeding, including the health of baby and mother as well as financial and environmental costs.

Carbon dioxide (CO₂) and nitrogen dioxide (NO₂) are emitted by manufacturing processes and by the transport required to move bulk quantities of milk from farm to factory and then from factory to distributors, retailers and consumers. In Europe, semi-finished products are transported to different sites for packaging and distribution, often in different European countries. In 2019 [powdered baby milks contaminated by Salmonella Poona](#) were manufactured in Spain and exported to France (17). In 2017-2018 the Lactalis factory in France exported 12 million boxes of [baby milk and food products which were potentially contaminated](#) by *Salmonella enterica* serotype *Agona* to Greece, Spain, Czech Republic and other EU countries, as well as to 83 countries all around the world, including developing countries such as Afghanistan and Bangladesh (18). These products were sold and used in pharmacies, supermarkets, hospitals and crèches, providing an illustration of the environmental costs of export, import and in-country transport and distribution, in terms of air miles, road miles and nautical miles.

1.2 Limit promotion of follow up, toddler and growing up milks

These ultra- processed, expensive, sweetened and flavoured milks account for 50% of absolute growth in the market for all formulas. In each country, these follow up formulas and especially

the toddler formulas produced higher GHG emissions than infant and specialty formulas. Calculations showed that GHG emissions of 3.95 kg of CO₂-eq. were attributed to the production of each kilo of infant formula, whereas the figure for follow up and toddler milk formulas was 4.04 kg of CO₂-eq. per kilo. As noted above, WHO maintains that these products are **unnecessary and unsuitable**. (3), as does EFSA (4).

1.3 Reduce GHG other than CO₂

Reduce other GHG which are emitted at every stage of production and transport of baby milks and foods. Nitrogen dioxide (NO₂) is emitted by transport and nitrogen oxides (NO_x) such as nitrous oxide (N₂O), as well as methane (CH₄), are all produced by intensive farming for milk production. New Zealand is a major milk producer and exporter ; the [New Zealand Landcare inventories](#) (19) show that "methane emissions from ruminants increased by 10% since 1990, while over the same period CO₂ emissions from road transport grew by 62% and nitrous oxide, N₂O, emissions from agricultural soils by 25%." In Australia, agriculture releases about 80% of nitrous oxide emissions. Their 2018 update on [Reducing nitrous oxide emissions from agricultural soils](#) (20) explains "Nitrous oxide is nearly 300 times more active as a greenhouse gas than carbon dioxide." The University of California's 2012 [article on research into increased fertilizer](#) used to stimulate feed and fodder production over the past 50 years (21), shows that "nitrogen-based fertilizer stimulates microbes in the soil to convert nitrogen to nitrous oxide at a faster rate than normal."

1.4 Reduce methane emitted by industrial dairy farming

Enteric fermentation in cattle and their manure produce methane, a far more powerful GHG than carbon dioxide. Although methane is less prevalent than CO₂ and degrades faster, it is much more potent because it traps 84 times more heat. The 2018 [TED talk on methane](#) (22) warns "Methane causes one quarter of the global warming that we are experiencing right now."

As explained in the TED Talk cited above, ruminant livestock produce methane from eructations as well as flatulence, but other factors also contribute, as listed in the 2015 [Report Carbon Footprints due to Milk Formula](#) (7) "The major contributors to GHG emissions were enteric fermentation (57%), manure (18%), purchased feed concentrate (8%), energy (8%) and fertilizer (9%)," all caused by industrial dairy farming.

1.5 Tackle carbon pollution - reduce air pollution

Air quality is a major problem in Europe. Heavy goods vehicles (HGVs) are used within and between European countries for the transport of the raw ingredients of baby milks and foods, including cow's milk, soy or rice, and also to transport from one factory to another, often situated in different countries, the high number of ingredients to be added : vegetable oils, sugars, vitamins, lecithin and other additives. HGVs are usually powered by diesel fuels, they cause road security problems and emit particulate matter, a risk for human health.

2. Facilitate the energy transition

Complex manufacturing processes require energy after the raw milk leaves the farm: at the factory, large amounts of electricity are required for cooling and storage, for separation into skimmed milk, followed by the processes of homogenization, pasteurization, evaporation, mixing, and spray drying in huge towers, and further cooling before packaging. Energy is needed for producing the heat-sensitive ingredients added to milk formulas, after the final heat

processing of the powder. Fuel is required for transport at every stage, as explained above. Liquid ready-to-feed formulas are even more bulky products to transport than formula powders.

"Use of Breastmilk Substitutes (BMS) has a negative impact on the environment due to release of Green House Gases (GHG) during manufacturing of ingredients like powdered milk, vegetable oils, sugars and additives; during the industrial processing to manufacture the formula and during the transportation at every stage of manufacturing and distribution. Formula feeding requires associated products such as tin for cans needed for packing the formula, plastic for bottles and teats, labels and printing for marketing and distribution, and sterilizers for sterilizing the bottles, manufacturing of each one of these products further produce GHG. This puts a burden on the planet additional to that of formula production and sale." [Formula for Disaster](#), 2014. (23) Also available in French and Italian.

3. Promote sustainable economies

Circular economies advocated by the green movement have the slogan "Say No to Over-consumption". They say No to the present economic model of "Take, Make, Dispose" which fails to recycle and treats the environment as a dumping ground.

3.1 Breastfeeding provides the classic example of the circular economy: the breastfed baby takes exactly what is needed. Nothing is transported because the product goes directly from the producer, the mother, to the consumer, her baby. Breastmilk is provided directly and efficiently : nothing is wasted and no natural resources are depleted. Each breastfeeding mother requires extra calories, but these do not need to come from foods that have a harmful impact on the environment, such as red meat and full-fat dairy. The extra 450-500 calories per day can be provided by protein complementarity using locally produced foods : grains+pulses+low-fat dairy+vegetables. The [US Department of Human Services](#) (24) provides advice on the calories required.

3.2 Bottle-feeding with processed baby milks is an example of our throw-away culture, in which the equipment needed is discarded after use. Unused baby milk must also be discarded after a bottle-feed because dangerous heat-resistant bacteria such as *Salmonella* and *Enterobacter/Cronobacter* species thrive and breed in warm milk, the reconstituted milk powder. The New Safety Advice in the [2007 World Health Organization guidelines](#) (25) explains that powdered infant formula is not sterile. They list the extra precautions that must be taken to reduce the risk of severe and potentially lethal infections caused by contamination of packages of powdered baby milks and cereals by these harmful bacteria.

4. Halt biodiversity loss

4.1 Deforestation caused by industrial farming threatens the survival of plants and animals and is a menace for the lives and livelihoods of populations. Intensive dairy farming to produce the milk for baby milks and milk-based cereal foods means land clearance ; it causes soil degradation and loss of soil fertility through over-exploitation and trampling by cattle : these compact the soil and reduce its micro-organisms.

4.2 Soy products : In Europe, soy cakes are imported to feed dairy cows. In soy-producing countries, especially Latin America, vast tracts of land and rainforest are cleared and huge quantities of fertiliser and pesticides are used to increase production of GMO soya. These lead to loss of biodiversity and increase the risks of pesticide poisoning and pollution of water from

run-off. Arsenic-rich pesticides are used to cultivate soy and also in the production of the brown rice used in baby milks and cereal foods as a substitute for high-fructose corn syrup.

4.3 Palm oil ingredients : Palm oil is one of the fats added to baby milks and foods. To meet the ever-increasing demand for this oil, plantations of oil palm in countries such as Indonesia and Malaysia have replaced and devastated the indigenous forest and caused irreparable harm to human and animal populations.

"The expansion of oil palm plantations is the primary reason for the destruction of the rain forests of Indonesia. The expansion of GMO soya plantations is a major reason for the destruction of the Amazon rain forests and cerrado, in Brazil and Argentina." See V. Shiva: [Gandhi's Ghani](#). (26)

5. Protect water resources – safeguard against pollution

In many countries, water is an increasingly scarce resource; aquifer depletion is accelerating as underground fresh water sources are in ever-increasing demand. This leads to water stress – water scarcity, water insecurity and contamination. Many parents do not realise that formulas are made from cow's milk and that their production is energy- and water-intensive. (61)

5.1 The production of cow's milk for baby milks leaves a heavy water footprint because it depletes precious water resources. The above-cited Lancet series Why Invest? (6) states "More than 4000 l. of water are estimated to be needed along the production pathway to produce just 1 kg of breastmilk-substitute powder." This figure is explained in [Formula for Disaster](#) (23) "The global average water footprint of whole cow milk is about 940 litres of water per kilo of milk. One kilo of whole milk gives about 200 grammes of milk powder, making an estimated water footprint of milk powder as 4700 litres of water per kilo of milk powder." Soy-bean and palm oil cultivation also require large quantities of water for irrigation and processing.

5.2 In addition, the preparation of baby milks needs a lot of water : first, it requires boiling the water to mix the powder, boiling or sterilising feeding bottles and equipment and thoroughly cleaning everything after use. The [WHO strongly recommends a decontamination](#) or lethal step to kill dangerous bacteria (25). These are heat resistant and they thrive and breed in warm milk, at the temperatures between 40 and 50°C which are given by manufacturers in their instructions on powdered formula packages. The lethal step aims to reduce, if not eliminate, the risk of contamination by mixing the powder at high temperature : first boil the water, then cool it to no less than 70°C before mixing the powdered formula. This indicates the amount of energy and water required to prepare each feed.

5.3 The protection of bottle-fed babies is a priority. Globally, just over 40% of infants are exclusively breastfed, meaning that in their first 3 years of life most babies consume powdered follow up formulas and cereals prepared with water several times a day. The water used to prepare formula and cereals may contain high levels of potentially toxic elements. Contamination of water sources is a serious problem worldwide ; for example, at least 140 million people are concerned by arsenic contamination. In some regions, arsenic is found in the bedrock and leaches into ground water, in others the increase in the use of [arsenic-rich pesticides for soy or fruit cultivation](#) continues to contaminate water sources (27). As seen above, formulas and cereals may also contain arsenic from the brown rice syrup used as a sweetener.

[Arsenic levels exceeding WHO standards](#) (28) have been found in ground water in several regions in Switzerland. Manufacturers of breastmilk substitutes promote the use of bottled water

in Europe and in the many countries where water supplies are unsafe. Nestlé has been criticised for exploiting public water supplies to sell as commercially bottled water at a profit. The World Health Organization does not recommend the use of bottled water to prepare baby milks and the 2016 [UK guidance](#) (29) explains the reasons why : that bottled water is not usually sterile (free from bacteria) and may contain too much salt or sulphate. However, in France bottled water companies recommend their brand on labels of bottled water for infant feeding, and this market is lucrative and expanding.

5.4 Protection of public water supplies : Vittel is a Nestlé brand and in France the company fills more than 2 million bottles of mineral water pumped every year from the water table, using 50% of the public water supply and depleting it dramatically. The 2018 article [Nestlé is draining a French village of its water](#) (30) reports that Nestlé has suggested that the town council should import water from an adjacent area, at a cost of 30 million Euros to build a pipeline kilometres long. Campaigners argue that water is an irreplaceable life-sustaining resource that should not be privatized : water for life, not for profit.

Pollution of public water supplies is increasing, and is caused by the run-off of effluents and slurry, a mixture of water and solids from dairy farming on an industrial scale. Our rivers are polluted by the expanding use of nitrates, pesticides and fertilisers.

WHO's 2011 [Background document on nitrate and nitrite in drinking water](#) (31) explains "In soil, fertilizers containing inorganic nitrogen and wastes containing organic nitrogen are first decomposed to give ammonia, which is then oxidized to nitrite and nitrate." WHO notes "Drinking water will be the major source of total nitrate intake, especially for bottle-fed infants."

5.5 PFOAs and PFAAs: One group of toxic chemicals produced during industrial manufacturing includes per- and poly-fluoroalkyl acids (PFAAs). These migrate from contact materials such as packaging – or are detected in our water, as explained in the study on Europe-wide estuarine export and surface water concentrations. The EU's 2017 Environment Research News Alert reports that high concentrations of PFAAs, including PFOS and PFOA, have been found in some [European rivers](#) (32), warning that these industrially produced chemicals are toxic, persistent and bio accumulative substances which are linked to negative health impacts such as hormone disruption and cancer. Lakes and other surface water may be contaminated and full removal of these substances in waste water treatment is expensive and difficult.

5.6 Ingredients of formula such as Human Milk Oligosaccharides require large quantities of water for their production: [Human Milk Oligosaccharides \(HMOs\)](#) (33) are complex sugars that are the third-most abundant solid component in breastmilk. According to research published in 2018, over [200 HMOs](#) (34) exist in breastmilk and it is important that all babies benefit from the way in which HMOs boost their immune system and create healthy microbiomes. Companies in the US are seeking to synthesise either one or two of these HMOs to create formulas said to be 'closer to human milk' and according to a 2018 report (35), they are [expanding production in Europe](#). In Germany and Italy, new 'production facilities' are therefore being built to produce HMOs and expand the number from two HMOs to five ; one company has received [15 million Euros from the EU](#) (36) to expand and conquer the expanding market – especially in China. These factories use large quantities of water and energy for fermentation and spray-drying to produce HMOs ; in 2018 in Germany, one company purchased the [water rights to a mineral spring facility](#) (37) and seven mineral springs. In 2018 Italy, a [new factory is being built with a US company](#) (38) to produce one variety of HMO to add to formulas.

6. Ensure good governance – avoid conflict of interest

Ensuring good governance and avoiding conflict of interest through rigorous identification and management is critical to ensure that policy-making is based on independent and objective evidence, free from commercial interests.

6.1 The case of Vittel in France cited above highlights the power of the lobby of multinational companies, and the apparent willingness of some local politicians to be influenced.

6.2 At regional and national level, the Lactalis scandal in France, when powdered baby milks and foods were contaminated by *Salmonella agona* bacteria in the manufacturing site, illustrates the pressures exerted on authorities – even in government Ministries.

6.3 At European level, there is conclusive evidence of efforts by Monsanto to influence Members of the European Parliament (MEPs) during the discussions on the renewal of the licence for glyphosate, one of the main ingredients of Monsanto's pesticide RoundUp.

Although **Monsanto lobbyists** were barred from contact with MEPs, it has emerged that the German Health Authority, BfR, acting as Rapporteur for EU Member States, based 50% of their report [on a copy-paste from Monsanto's own report](#) (39). The same article explains that the **European Food Safety Authority, EFSA**, recommended that glyphosate was safe for public use. EFSA has repeatedly faced allegations that their assessments are not independent, further emphasizing the need to ensure regulatory independence. EFSA ignored the opinion of WHO's International Agency for Research on Cancer (IARC) that glyphosate is a 'probable human carcinogen.' The IARC found that 'almost three quarters of the peer-reviewed papers found evidence of genotoxicity, compared with just 1% of the industry analyses.'

7. Reduce waste and environmental pollution

7.1 Much of the packaging used for breastmilk substitutes is plastic, as are all containers of bottled water. Plastics do not biodegrade ; at present most are not compostable. Instead they solar-degrade and end up in our rivers and oceans as nanoplastics, tiny pieces of plastic that mammals and especially birds and fish mistake for food to feed their young. Energy costs for plastic production should also be taken into account, making it even more urgent to increase recycling rates, which are extremely low in many countries. In 2016, Canadian environmentalists already warned of the environmental impact : [Too many water bottles end up in landfills](#) (40).

7.2 Not only mineral water bottles but also many other items of infant feeding equipment cannot be recycled. Examples are plastic feeding bottles, teats as well as the plastic pumps and equipment used to express and store breastmilk. These cannot be re-used or shared because of the risk of infection and difficulty of cleaning tiny parts. In the USA, it is estimated that 2 million breast pumps are sold to families. They are single-user equipment and once the package is opened, it cannot be returned ; neither can storage bags for pumped expressed breast milk. How many of these, as well as feeding pouches and plastic packages for infant cereals end up in landfills - and what is the carbon footprint and cost of the energy sources used to produce all this plastic?

7.3 Feeding bottles and Bisphenol A : Although banned in many countries, plastic feeding bottles made of polycarbonate are still used in many others. These bottles contain Bisphenol A (BPA), a known endocrine disrupting chemical (EDC). Even the substitutes for BPA, Bisphenol F and S, are not without risk. These toxic chemicals can leach from feeding bottles into the baby

milk ; these bottles cannot be recycled and end up in landfills. In 2010, scientists were already warning that [Hard plastics and the epoxy resins](#) (41) used to line tin cans decompose in warming oceans and release potentially toxic substances such as endocrine disruptors like BPA. For a full discussion on measures to ban BPA and other EDCs, with focus on the European Union, see the 2017 article [Endocrine Disrupting Chemicals and the battle to ban them](#) (42).

8. Promote toxic-free circular economies

8.1 The major initiative [Nurturing Care for Early Childhood Development](#) (73) was endorsed by the G-20 in November 2018. The section on Environmental Health emphasises "To protect children's health and support their development, it is essential that they have access to clean water and sanitation, good hygiene practices, clean air and a safe environment. But increasing urbanization, industrialization, and climate change are all taking their toll on the environments in which children grow, play and learn." The Initiative shows how low-level exposures to environmental toxins can result in substantial – though silent - disability "These toxins and pollutants damage the brain, affecting cognition, school performance, and social and emotional behaviour, and can cause intellectual disability. Creating environments that are healthy, green and free of pollutants will ensure that young children and their families can flourish."

8.2 Toxic Chemicals. Many of these chemicals may be found as contaminants in baby milks and foods, as well as in the water used to prepare the formulas and cereals. Since 2007 it has been shown that [Arsenic as an endocrine disruptor](#) (43) has a potent effect on oestrogen receptors, even at very low doses. As noted above, infants and young children who are formula-fed ingest arsenic in the water used to make up feeds. But baby milk formulas and baby cereals may also contain arsenic from the cultivation of brown rice irrigated by arsenic-rich ground water. Brown rice syrup is also used as a substitute for high-fructose corn syrup to sweeten formulas and foods. However, in Bangladesh, where there are high levels of arsenic in ground water, a 2008 study reported that [breastfeeding has been shown to protect infants against exposure](#) (44).

High levels of aluminium in formula remain a concern and to date no action as been taken despite successive warnings from scientists in research articles (45): [The aluminium content of infant formulas remains too high](#).

8.3 Pesticides and fungicides. Among the most significant and prevalent of all toxic chemicals are those pesticides and fungicides used in large quantities in agriculture and horticulture. Many of these are EDCs and include not only DDT, still used for some applications and widely persistent in the environment, but also glyphosate, the main ingredient of the herbicide Roundup. Glyphosate, like several pesticides, has carcinogenic properties. Discontinuation of traditional environmentally-friendly but labour-intensive agricultural practices, as well as the spread of genetically modified, GM, crops, have led to increased worldwide reliance on these chemicals, which are poisons for pests, weeds – and humans. Widespread concern over the use of glyphosate-based herbicides and the risks associated with exposures have led to action being planned in some EU member states. However, the intense opposition in France from manufacturers and farmers has resulted in back-tracking on campaign promises. This is documented in the article [EDCs and the battle to ban them](#) (42).

8.4 Pesticide residues are found in baby milks and foods. The 2018 [WHO Report on Climate Change and Food Safety](#) (46) notes that climate change will increase pesticide use by forcing farmers to grow crops in new zones of cultivation, where different pests and weeds may be

attracted. Global warming is also favourable to the expansion and multiplication of pests and weeds, resulting in increases in pesticide, herbicide and fungicide use - and therefore of human exposures, to which infants and young children are particularly vulnerable.

8.5 Breastmilk, the sentinel: the canary in the mine. Breastfeeding provides strong motivation for reducing chemical contaminants that can accumulate in breast tissue. The message that breastmilk may contain chemical residues is a powerful campaigning tool to eliminate toxic chemicals from our environment. However, campaign slogans, particularly those supported by industry, may become alarmist and refer to ‘polluted breastmilk’ or ‘toxic breastmilk’. At the same time, such messages fail to address the larger problem – the body burden of toxic chemicals in all of us, starting prenatally.

This problem was addressed by Norwegian experts in the Scientific Committee for Food Safety, who compared prenatal and postnatal exposures in their 2013 [Report on Benefit and Risk Assessment of Breastmilk for Infant Health in Norway](#) (47).

The experts concluded: “Taking the present-day level of contaminants in Norway and the long duration of breastfeeding (12 months) in Norway, contaminants pose a low risk to Norwegian infants and that the benefits of breastmilk to Norwegian infants clearly outweigh the risk presented by contaminants.” They explain further “Breastmilk also contains a number of specialised components, including growth factors, factors with anti-microbial and anti-inflammatory properties and selected immunological components which boost the maturation of the infant’s immune system. Infant formula fulfils the infant’s established nutritional needs, but does not provide the specific protective factors which are present only in breastmilk.”

Turning to infant formula is therefore not the solution, and parents may feel powerless when informed about chemicals in the womb. The same holds true for exposures of males to toxic chemicals, and the impact on male fertility. The 2014 Report by 5 Nordic countries on the [Cost of Inaction, Socioeconomic analysis of effects of EDCs on male reproductive health](#) (48) examines the economic implications of the negative impacts of chemical exposures of males. These include decreased fertility, increased occurrence of hormone-related cancers and suppression of the immune system.

These are the most urgent reasons to eliminate toxic chemicals from our environment, so that every person is protected, especially future parents. The recognition of the body burden shared by men as well as by women can lead to a sense of shared responsibility to take action. It is therefore vital to develop national policies on EDCs, including the pesticides to which agricultural and horticultural workers are at greatest risk of exposure. It is necessary to consider the impact on children’s health and development, especially when pesticides are sprayed near schools and homes.

9. Mitigate impact of climate-related disasters and emergencies : emphasise vital role of mothers

9.1 Climate change is causing an increase in typhoons, tropical storms, flooding and wildfires. The growing number of emergency and relief situations underscores the need to ensure safety, defence and disaster preparedness. The 2018 WHO [Report on Climate Change and Food Safety](#) (46) spells out the consequences of climate change for human health and survival: global warming increases deaths from malnutrition, diarrhoea and heat stress.

9.2 Breastfeeding allows families to adapt to these unanticipated and unknown future problems. When disasters strike and when food and water supplies may be scarce or polluted, breastfeeding

provides sustainable food security, especially when mothers are supported to breastfeed optimally. It was demonstrated in the 2015 publication that [Breastfeeding thus provides a cushion of safety](#) (49) in the face of emergencies; support for and care of every mother is vital for survival of infants and young children. The supplementary food ration for mothers who breastfeed their child is more efficient than delivering formula, with all the water supply and safety, as well as cleaning and storage problems which these create.

9.3 The dangers of providing donated baby milks and commercial complementary foods are well documented in the situations where polluted water supplies and unhygienic conditions make preparing feeding bottles highly risky. Food poisoning increases the risk of death and disease in infants because of bacterial contamination of powdered formulas and cereals. [Bacterial proliferation](#) (25) of *Salmonella* species, *Cronobacter/Enterobacter* species or of spore-forming bacteria such as *Bacillus cereus*, intensifies under warm, humid conditions. The 2019 article [Food safety considerations for commercial complementary foods from global guidance on infant and young child feeding in emergencies](#) (74) spells out these food safety risks, with specific reference to commercial complementary foods.

9.4 Such intrinsic contamination of powdered milk formulas can occur at factory level. This means that, as explained in the 2007 WHO Guidelines, [bacteria may already be present in the tins and packages](#) (25) and even minute amounts will multiply rapidly when the milk powder is reconstituted with warm water and stored.

The table of [Product Recalls 2014-2019](#) (50) provides a list of contaminated infant and young child feeding products withdrawn by governments or recalled by manufacturers. However, these alarming alerts receive little publicity. Strains of *Salmonella* species, of *Cronobacter-Enterobacter* species, or spore-forming bacteria such as *Bacillus cereus* can be introduced when specific ingredients are added after pasteurisation and after the powder has been heated again in the drying tower. An example is the additive lecithin which was contaminated by *Salmonella agona* from the vacuum cleaners and factory floors of the Lactalis factory in France, and was then introduced into the milk powder after it was dried and during packaging. Milk formulas contaminated by *Salmonella agona* caused serious infections in 146 infants in France in 2005-6, and further infections in France, Spain and Greece in 2017-2018. The French [Government report on these Salmonella infections](#) (51) was published in French but includes a summary in English.

10. Promote equality

10.1 Inequality and poverty are identified as key problems which are increasing in many societies. Breastfeeding is the great leveller, and contributes to efforts to eliminate poverty and challenge inequality. The high cost of formula can easily overwhelm family budgets. The costs of advertising budgets are passed on to the consumer. In the USA in 2004, the budget for TV, print and radio advertisements for formulas was 46 million USD. The 2018 [Save the Children report on milk formula marketing](#) (52) reveals that leading companies spend UK£36 on marketing for each and every baby born worldwide, amounting to UK£5 billion every year.

10.2 Nestlé is the world's largest packaged food company, producing 1.7 million tonnes of plastic packaging in 2018 - an increase of 13% over the previous year. Packaging costs are increasing; it is regrettable that, even though the company's [introduction of recyclable packaging](#) (53) is a positive step for waste reduction, it will make infant feeding products even more costly for families if such costs are passed on to the consumer.

III. Conclusion : Why invest in Green Feeding?

Action needed in each country based on WBTi assessments

Why is it necessary to search for complex and expensive technological solutions to the problems of environmental degradation and climate change when one key solution is already staring us in the face? This is a classic case of a high-tech costly solution versus a low-tech local solution. Optimal breastfeeding practices complemented by family foods produced using sustainable agricultural practices are healthy and environmentally friendly ways to feed and nourish our babies and children. They are the first steps on the road to Green Feeding.

However, breastfeeding and sustainable infant feeding practices are under threat ; there is an urgent need for policy decisions leading to action and increased investment at the highest political level.

As noted in the 2018 Ten-country reports on Green Feeding in the [WBTi Assessment Report](#) (15) "The status of breastfeeding practices globally, an environment friendly way of nourishing infants and young children, remains dismal with only 43% infants who are exclusively breastfed and continued breastfeeding rates at 2 years being 46%. Global nutrition targets 2025 envisage increasing the rate of exclusive breastfeeding in the first 6 months up to at least 50% which can be achieved by implementation of the policies and programmes on breastfeeding and infant and young child feeding as recommended in the global strategy for Infant and Young Child Feeding and regulating the marketing of the BMS." Such action also needs exploring women's wishes and projects about their breastfeeding goals and obstacles, and their need for skilled and sympathetic support.

The [World Breastfeeding Trends Initiative \(WBTi\)](#) (54) conducts national assessments of the state of the world's breastfeeding policies in more than 110 countries of which 97 have completed their National Report. <http://worldbreastfeedingtrends.org/>

The **WBTi is a participatory process** : it seeks to involve all concerned parties working on infant and young child feeding, while avoiding conflicts of interest. Participants include governments, international agencies, academia, civil society and NGOs. Local people collect information, analyse the findings, locate gaps and take action based on the results.

The **national situation is reviewed using fifteen indicators** (54) of the status of: National policy, programme and coordination to assess the status of : Baby-Friendly Hospital Initiative ; Implementation of the International Code of Marketing of Breastmilk Substitutes ; Maternity protection in formal and informal work sectors ; Health and nutrition care system to support breastfeeding; Mother support and community- based support and outreach for pregnant and breastfeeding mothers ; National strategy to improve information support, actively implemented at local levels ; Infant feeding and HIV ; Infant feeding during emergencies ; Mechanisms for monitoring and evaluation of systems. A further 5 indicators provide statistical analysis for rates of: Timely initiation of breastfeeding within one hour of birth ; Exclusive breastfeeding for the first six months ; Median duration of breastfeeding ; Bottle-feeding ; Complementary feeding – introduction of solid, semi-solid or soft foods.

How to invest in breastfeeding?

These measures require an increase in budget lines, especially to curb or ban the marketing practices of baby milk and food companies that undermine breastfeeding. It is critical for

governments to implement and monitor the International Code of Breast-milk Substitutes and the subsequent relevant resolutions of the World Health Assembly, the highest policy-setting body in international health. WHO's 2017 [Frequently Asked Questions about the Code](#) (55) explains them in detail and is available in all six official languages of the United Nations.

Investment is needed in education to counter the false information provided by the baby food industry using pervasive and pernicious advertising and unfounded claims to convince families that their products are 'closer to breastmilk,' 'equivalent to breastmilk'. Nothing could be farther from the truth, as summarised in the comparative table [What's in Breastmilk](#) (12). Although unsubstantiated claims and the terms 'maternalized' or 'humanized' are not allowed under EU legislation, these claims are still frequently found on product packages.

Investment is needed to protect and support pregnant and breastfeeding mothers in hospitals, in the workplace and in the home. Governments must implement the Ten Steps of the Baby-Friendly Hospital Initiative and increase maternity protection at work by ratifying, implementing and monitoring the maternity protection Convention and Recommendation of the [International Labour Office, ILO, Convention 183](#) (56) and its [ILO Recommendation 191](#) (57).

Investment is needed in support and counselling services for women who are breastfeeding and having difficulties or questions. This should be provided by peer counselling, mother to mother groups and competent and well informed health care professionals. The World Health Organization's (2018) Evidence-informed Guideline on [Counselling of women to improve breastfeeding practices](#) (75) explains why every person in contact with mothers and their children should have in mind that breastfeeding counts, and should address the mother to competent support persons and counsellors, if needed.

In the words of [Dr. Julie Smith](#) (14) "**It is time to start talking seriously about how reducing the unnecessary promotion, use and societal costs of formula milk feeding can help tackle the greatest challenge humanity has ever faced, sustaining Mother Earth.**"

IV. References and resources

Explanation : This list contains all the materials we reviewed in preparing these documents. The numbers in text correspond to the numbers in this resources document. For ease of reference, we included hyperlinks to online publications whenever possible. We have included some publications in languages other than English.

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