

A circular economy for nappies

and how to implement it locally

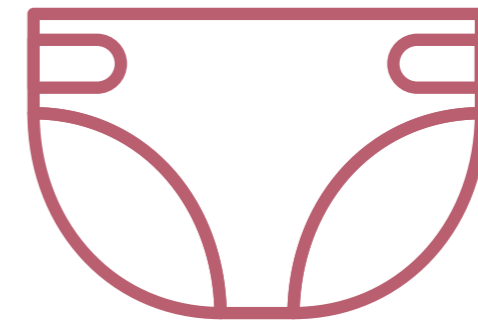




Every minute
around the world
over **300,000**
disposable
nappies* enter
landfills,
incineration
or pollute the
environment,
including our
oceans.



>300,000





In support of this report

In his address to the Climate Change Conference in Madrid in December 2019, the United Nations Secretary-General, Antonio Guterres, said we are knowingly destroying the life support systems of our planet.

This dire assessment is based on the conclusions of three major reports from the Intergovernmental Panel on Climate Change. Perhaps the greatest danger inherent in the coronavirus pandemic is that we turn our minds away from the most fundamental challenge confronting our survival, namely that of drastically reducing anthropogenic Greenhouse Gas Emissions to levels whereby we can achieve Net Zero Carbon by 2050.

We can only achieve that goal if we undertake urgent transformations of our consumption and production patterns, moving from linear to circular economies. None are immune. Necessity is the mother of invention and solutions abound, a great example being the market-entry of truly compostable baby nappies to replace planet-polluting “disposable” plastic nappies.

Peter Thompson, United Nations Secretary-General’s Special Envoy for the Ocean

The 2019 World Bank report “Oceans of Opportunity” states that single use plastic disposable nappies are the largest contributor to Indonesia’s marine pollution (21%). While the Global Plastic Action Partnership is focusing more on plastic packaging, we recognise the need to address all aspects of plastic waste in support of the Government of Indonesia’s ambitious plastic pollution reduction targets. We are inspired by the impact gDiapers and circular nappies can have in delivering a circular economy for plastics and we applaud their efforts.

Kristin Hughes, Executive Director Global Plastic Action Partnership



“Dirty nappies
could be
considered the
most harmful
item of marine
litter”

Jo Royle
Director of Common Seas & Advisory



In support of this report



I am delighted to support the publication of this important report and promote the very necessary transition to a Circular Economy. Single-use plastic nappies are the scourge of the planet. A truly Circular solution is the only way to address the issue. This report will help enable cities to meet their Zero Waste goals and countries to achieve their UN Sustainable Development Goals.

Ben Goldsmith, Environmentalist

Excrement of all kinds is the world's natural compost. From putting horse manure on the Queen's roses to fertilising the fields that fill our breadbaskets. Poo is flora's great life booster. The ancient Egyptians understood this cycle. They worshipped as a God the great composters of the desert, the scarab beetle. Yet for the past half century we have been doing something completely unnatural to this most natural and life-giving waste. We have been taking from nature and not giving back. We have been wrapping in plastic the things we most want to protect, our own babies. Everything we know about modern nappies is wrong. They take something natural – our waste and by wrapping it in plastic they make it unnatural and impossible to return to nature. Our addiction to plastic nappies is the ultimate example of our short-sightedness, breaking Nature's own circular economy where everything, including ourselves, should go back to the earth. This much-needed report shows how we can undo the huge harm we are causing, dumping 20 million disposable nappies across the globe every single hour. It clearly lays out how we can radically rethink an industry that is responsible for extraordinary pollution and transform poo into a revenue and resource regenerative model. Those living in the 17th century knew all along; 'Where there's muck, there's brass'.

Siân Sutherland, Co-founder - A PLASTIC PLANET

We can not address the global plastic waste crisis without finding solutions to disposable nappies. I commend this report and urge both manufacturers and governments to implement this circular solution.

Dr. Amardeep Wander, Asia Pacific Waste Consulting

We know from direct experience that it is technically possible to compost compostable diapers. The composting infrastructure is widely available to receive them. There are many issues needing to be resolved, both legislative and in terms of collection systems and this report will stimulate government, local authorities and industry to work together to solve them, and quickly.

David Newman, Managing Director BBIA UK

Acknowledgements

Special thank you to Kim Graham-Nye of gDiapers for leading this project, Candice Quartermain for her support in the concept development of the Blueprint, and Stella Chavin from Ellen Macarthur Foundation for steering its publication.



Nappies are a dirty business. Not only does the global disposable nappy industry extract over 248 million barrels of crude oil annually, but it creates over 38 million tons of solid waste per year¹.

The vast majority of dirty nappies end up in landfills, contributing to greenhouse gas emissions and climate change, some are incinerated, while the remainder pollute our oceans - destroying eco systems and marine life.

Consumers love the convenience and the efficacy of disposable nappies, but their contribution to both climate change and the growing plastic waste crisis can no longer be overlooked. Simply put, nappies need a change.

The good news is the negative environmental effects of disposable nappies can be solved by applying the principles of the circular economy and designing out waste from the outset.

There are currently two circular approaches that we are aware of. The first is reusable nappies whereby nappies are washed and re-used. The second is the introduction of compostable nappies. By replacing oil-based plastics with bio-based materials, and building an effective collection infrastructure, the used product can then compost and regenerate natural systems, eliminating waste.

With 95% of families in developed countries choosing disposables, this report focuses on compostable nappies a direct alternative to single use plastic nappies.

Success for this approach will require a total commitment from both nappy manufacturers and governments. Manufacturers need to shift away from polypropylene and design for Extended Producer Responsibility. Governments need to facilitate collaboration between waste treatment providers, and review existing waste codes so the circular economy can fulfill its potential.

The following report outlines not only the benefits of a circular economy solution and the enablers necessary for success, but also provides a blueprint for implementing a circular solution to nappies in your area, along with case studies.



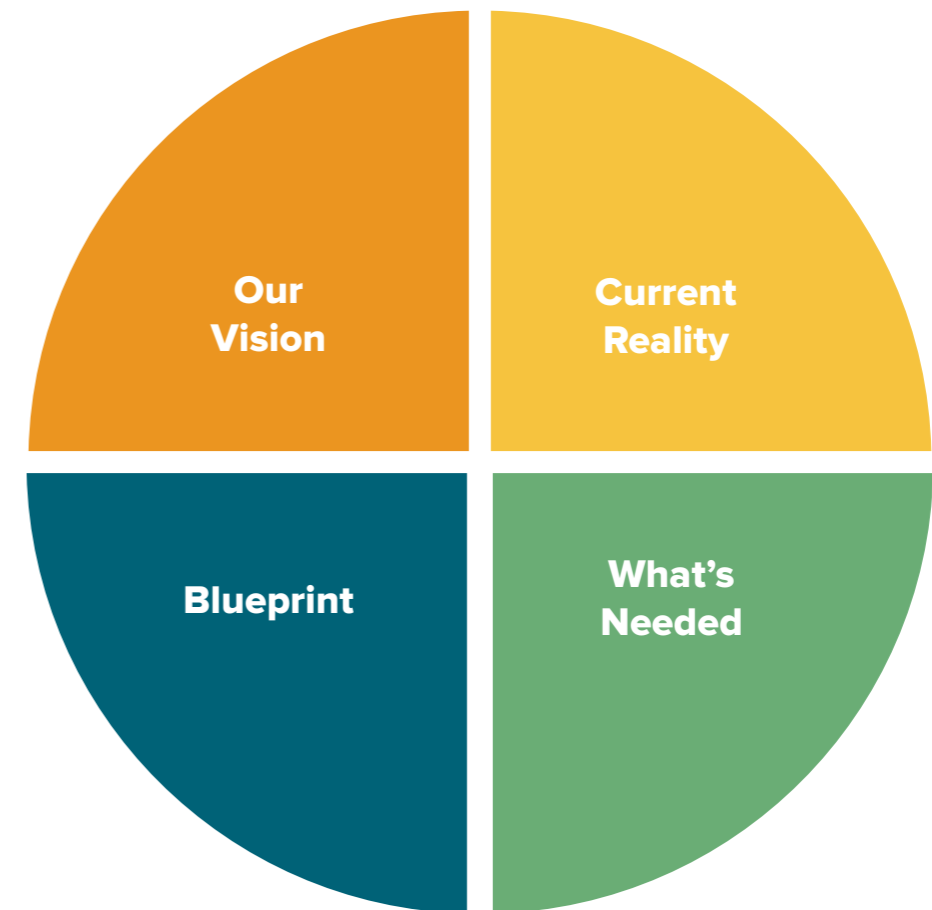
- **To win the war on waste we need to address disposable nappies**
- **By applying the principles of the circular economy, we can find solutions to nappy waste**
- **Governments can facilitate collaboration and regulations**
- **True costs need to be accounted for, in order to level the playing field for consumers**

¹ National Geographic Human Footprint, Euromonitor 2017, Science Report – SC010018/SR2 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/291130/scho0808boir-e-e.pdf

Nappies
to **nature.**

Not **landfill.**

Executive summary



Executive summary

Vision

To eliminate over 38 million tons² of plastic waste per year from the global waste stream by implementing a circular economy solution for disposable nappies.

This report demonstrates the feasibility of a world where nappies shift from oil-based to renewable-based; from landfill-bound to resource generation; and from a burden on our children to an inspiration in how to re-imagine products in a circular economy.



Deliver on UN Sustainability Goals 12, 13, and 14



Significantly contribute to “Advancing Towards Zero Waste Declaration” by reducing household solid waste & landfill bound waste



Regenerate natural systems



Maximise existing infrastructure and collaboration

Executive summary

Current Reality

The existing model for disposable nappies is linear: taking non-renewable resources; making disposable nappies; and creating unmanageable waste for governments and the environment.

Every year around the world:

TAKE



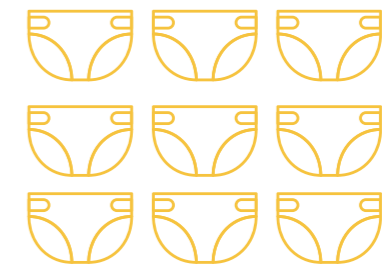
248.5 million
barrels of crude oil³



MAKE



167 billion
disposable nappies⁴



WASTE



38.4 million
tons of solid waste⁵



And where does all this waste go?

To date, the vast majority of nappies enter landfills or pollute the oceans.

³ National Geographic Human Footprint, Euromonitor 2017, 4 & 5. Science Report – SC010018/SR2 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/291130/scho0808boir-e-e.pdf



Executive summary



What's Needed

1 Compostable Nappies

Manufacturers must eliminate all non compostable materials from nappy production and demonstrate through third party testing their product can be safely composted to national standards.

2 Regulations

Waste regulations regarding human waste vary from country to country. Attaining the relevant waste codes, permits or exemptions is critical.

3 Collection

All used nappies must be collected.

4 Composting Facility

Composting technology/partners must be identified.

5 Supportive City/Council

6 True Costs

Current nappy prices do not account for externalities making plastic nappies artificially cheap.

Executive summary

Blueprint

A circular economy for nappies requires a localised solution due to the variables in waste regulations, existing infrastructure, and cultural practices.

European nations will require waste code amendments but will have ample commercial composting operators. Conversely in other regions, waste codes are less of an obstacle but they may require new distributed composting facilities. This blueprint is designed to accommodate for this variability.

Questions

Understanding the current system in your area is the first step to changing it. This blueprint outlines questions to help identify the key players, the pain points, the financial flows and who bears them, in order to transition to a circular economy solution for nappies in your area.

Case Studies

This blueprint explores two case studies to provide examples of how a circular solution can be implemented.





Vision

A circular economy nappy solution can advance the progress of cities and national governments towards achieving United Nations Sustainable Development Goals and meeting C40 commitments for cities which are signatories.



Deliver on UN Sustainability Goal 12 Responsible Production & Consumption

- Design out the very concept of waste from nappies by fundamentally rethinking materials used
- Shift to only compostable materials
- Decouple from the consumption of finite fossil fuels
- Turn used nappies into nutrient-rich compost, creating valuable SOM (Soil Organic Matter)



Deliver on UN Sustainability Goal 13 Climate Change

- Help limit global temperature rises to less than 1.5C by keeping fossil fuels in the ground
- Reduce CO₂ emissions and methane production by avoiding landfill and incineration – both significant greenhouse gas contributors
- Aid carbon sequestration in soil by providing compost⁶



“The increased input of carbon from organic soil amendments (animal manure, compost, crop residues, sewage sludge) is one of the most efficient measures for soil carbon sequestration”⁷



Deliver on UN Sustainability Goal 14 Life Below Water

- Significantly reduce marine pollution by offering Product as a Service (PAAS) and collecting all used nappies



Contribute to C40 Cities Advancing Toward Zero Waste Declaration

- Composting nappies contributes to the signatories pledge to both reduce the volume of solid waste generated and reduce the amount of waste sent to landfills and incineration.

^{6,7} Department of Environment, Climate Change and Water NSW February 2011 Short report: The benefits of using compost for mitigating climate change <https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/waste/110171-compost-climate-change.pdf?la=en&hash=7ADC0B32600A8EE49E72187E4A027FA1C809AEAE>

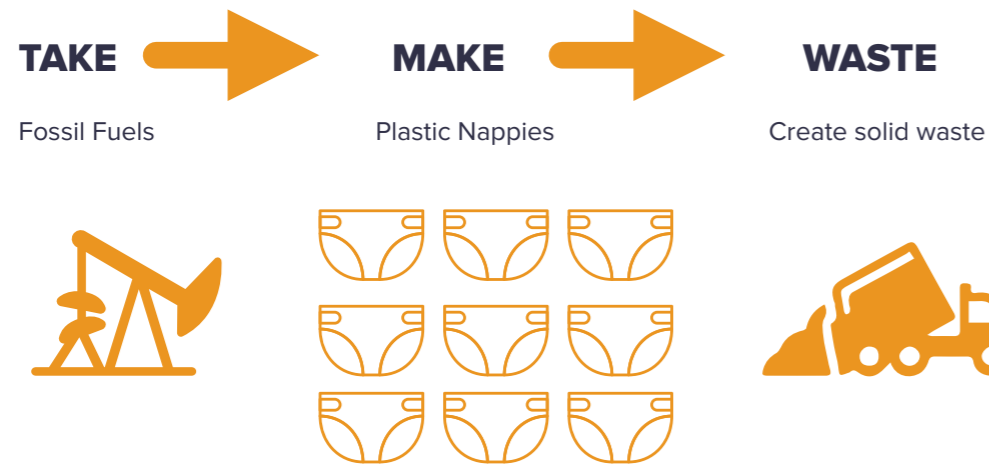
Regenerate Natural Systems

Inherent in the circular economy is shifting away from the linear “take, make, waste” model in order to regenerate our natural systems.

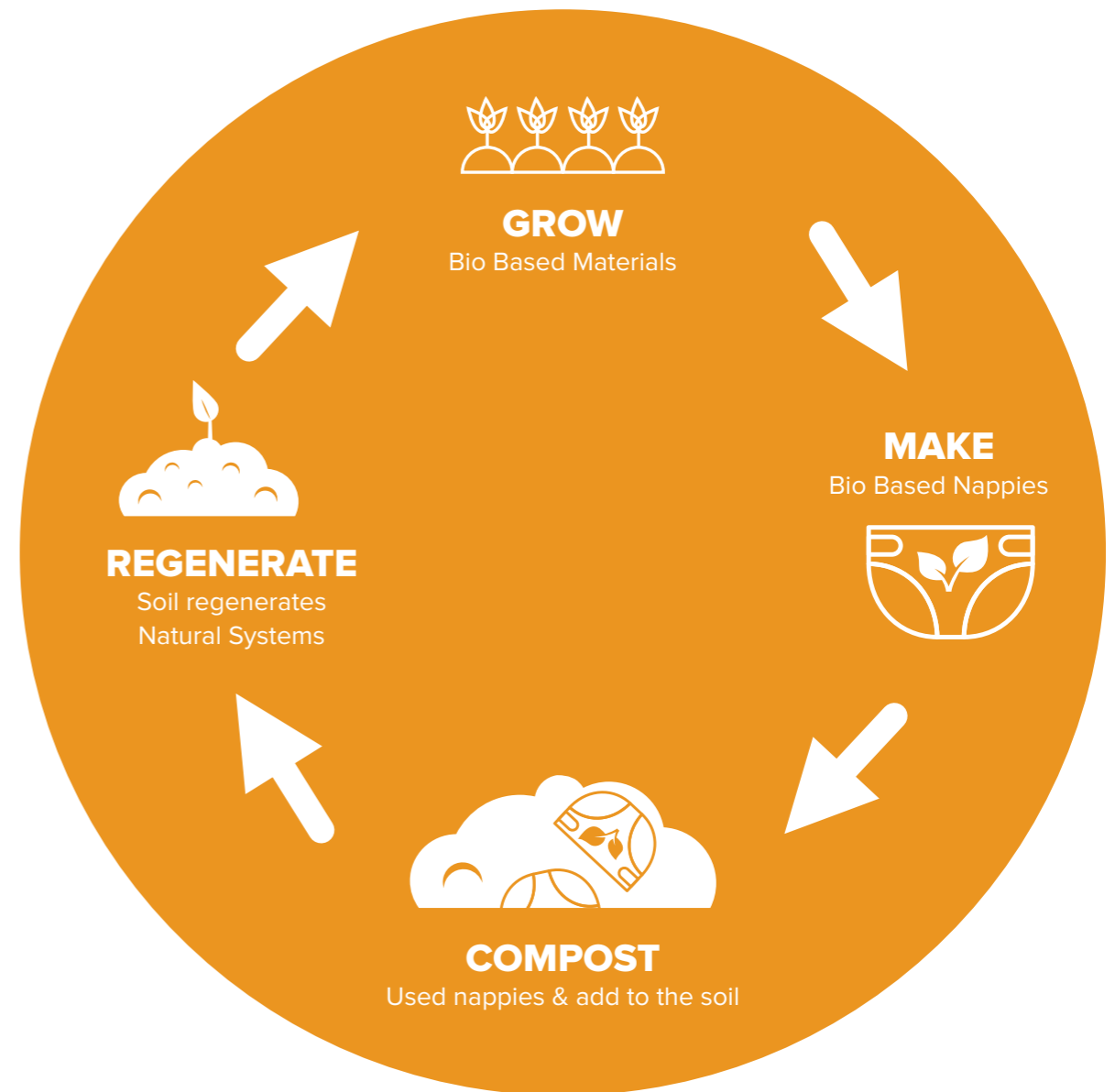
When nappies are composted they create a nutrient rich material that is added to soil to improve its quality. Compost containing certified compostable nappies is considered Soil Organic Matter (SOM).⁸

SOM is proven to improve water-holding capacity and aeration, enhances the absorption and release of nutrients, and makes soil less susceptible to leaching and erosion.⁹

Linear Model



Circular Model



⁸ Based on gCycle compostable nappy testing to Australian Standards 4454

⁹ Department of Environment, Climate Change and Water NSW February 2011 Short report: The benefits of using compost for mitigating climate change <https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/waste/110171-compost-climate->



Maximise existing infrastructure & collaboration

Often innovations for plastic waste management require large scale investment in new infrastructure such as recycling plants and incineration facilities to manage the waste after it has been produced.

Not only are these plants expensive, they need to be duplicated in each geography making them cost prohibitive for many nations.

By contrast, a circular nappy solution using certified compostable nappies can be processed through existing infrastructure such as commercial composters.

As cities work to reduce landfill bound waste, food and garden waste separation is becoming a priority, in turn increasing the demand for commercial composting facilities. With this increase in commercial composting capacity, there is an opportunity to collaborate with operators by establishing a dedicated compost pile to include nappy waste.

FOGO as a catalyst

The Australian city of Bega introduced FOGO (Food Organics and Garden Organics) collection in order to reduce landfill bound waste.

To incentivise households to separate organic waste, weekly rubbish collection was shifted to fortnightly. An immediate consequence was the accumulation of nappy waste for parents of young children. Residents did not accept storing up to 80 dirty nappies in between collections. For FOGO to succeed, disposable nappies needed to be addressed. See the resulting pilot project on page 48.



**No plastic.
No pollution.
No waste.**



Current Reality

The linear economy model for disposable nappies is simultaneously depleting our finite resources and burdening our governments and the environment with plastic waste and pollution.



Nappies by Numbers



EACH NAPPY CONTAINS ONE CUP OF CRUDE OIL¹⁰



20,000,000

DISPOSABLE NAPPIES ARE PRODUCED PER HOUR AROUND THE WORLD¹¹



73 TONNES
TONNES OF SOLID WASTE IS CREATED PER MINUTE GLOBALLY¹²

¹⁰ National Geographic – Human Footprint

¹¹ Euromonitor 2017

¹² Weight of plastic per nappy provided by: An updated lifecycle assessment study for disposable and reusable nappies Science Report – SC010018/SR2 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/291130/scho0808boir-e-e.pdf Number of nappies provided by: Euromonitor 2017



Current Waste Streams

Landfill bound

- The vast majority of dirty nappies enter landfill
- Modern landfills are built precisely to avoid biodegradation, which means the volume of waste simply compounds with every year
- Landfills emit methane and CO₂, which are both greenhouse gases and contribute to climate change
- According to the EPA, landfills are the third largest source of anthropogenic methane in the United States

Ocean pollution

- According to a World Bank Report, nappies constitute 21 percent of the waste polluting Indonesia's seas
- According to a study conducted by Ecoton in the Brantas River in East Java, 80% of fish examined were found to have ingested plastic fibres from disposable nappies
- The South Pacific island nation of Vanuatu has become the first country to introduce a ban on the sale and use of disposable nappies. 27% of Vanuatu's overall waste currently comes from disposable nappies.¹³ The ban comes into effect in December 2020

Incineration

- Incineration of plastics remains controversial yet some nations do burn disposable nappies as part of their overall household waste incineration
- Incineration contributes to CO₂ emissions and climate change
- Incineration is not part of a circular economy



“When you take fossil fuels out of the ground, make plastics with them, then burn those plastics for energy, it's clear that this is not a circle - it's a line.”

Rob Opsomer
Ellen MacArthur Foundation

¹³ Asia Pacific Waste Consultants



Current Reality

Reusable Nappies

Reusable nappies have improved significantly in the last 15 years and are enjoying a resurgence in many developed countries as parents are more aware of plastic waste and the effect it has on climate change. To date, however, the challenges of cloth nappies for both performance and perceived convenience has led to their marginal use. Developing countries have different obstacles with reusables nappies, such as access to water and/or safe washing facilities to deal with human faeces, which has unfortunately created an increased demand for disposable nappies. That said, reusable nappies should be encouraged as a circular solution and the most economic nappy option available to parents.

Nappy recycling

As the graphic illustrates, plastic nappy recycling does not fundamentally shift the take, make, waste paradigm:

- Nappy recycling perpetuates the extraction of fossil fuels to make virgin plastic-based nappies
- With over 20 years of attempts, there is currently no market for recycled products from nappies
- Even if options can be found, the recycled products continue to create landfill-bound waste
- In addition, nappy recycling is complex and requires large scale infrastructure. This in turn requires significant investment and needs ongoing duplication for impact (i.e. recycling facilities in each geography).

In summary, nappy recycling doesn't fundamentally shift the industry out of the linear economy and does nothing to regenerate our natural systems.

Existing Eco-disposables

Many brands claim compostable, biodegradable or natural materials yet continue to use plastic for the fastening tabs and often plastic films. Although using less plastic is beneficial, any amount of plastic renders the nappies un-compostable as the plastic will contaminate the output.

In addition, compostable nappies that are not separated, collected and composted, will simply enter the existing waste streams.

Linear Economy



Recycling Economy



Circular Economy





What's Needed

For a successful introduction of a circular nappy solution, there are 6 key factors which need to be established. As with all new innovations, challenges will arise, but the status quo with mounting plastic nappy waste is simply unsustainable. With persistence and collaboration any challenges can be overcome.



1 Compostable Nappies

Nappy manufacturers must eliminate plastic and all non compostable materials from nappy production for any circular solution. This includes plastic top sheets, plastic back sheets, plastic acquisition layers, and most notably plastic fastening tabs. All ingredients must prove to return to nature in a neutral or beneficial way.

In addition, the manufacturer must demonstrate through third party testing that their product can be safely composted to national standards.

2 Waste Regulations

As previously stated, the regulations to treat human waste vary from country to country. Some countries rely solely on the quality of the compost created and the testing it passes. Others clearly restrict the input of human waste, regardless of the quality of the output.

Currently the EU does not permit composting nappies, although exemptions are in place in at least one major European city to trial compostable nappies in 2020.

In the Case Studies provided, the nappies were proven to exceed Australian Compost Standard AS4544, and would be expected to pass most national standards that do not restrict human waste as in input.

3 Collection

Offering parents compostable nappy options is only part of the solution. In order to ensure the used product is actually composted, collection and regeneration are critical steps. This can be facilitated through nappy manufacturers practicing Extended Producer Responsibility in partnership with local businesses or councils.

Potential collaborations for collecting used nappies

- Partner with Household FOGO collection (Food Organic - Garden Organic)
- Central drop off location for FOGO
- Partner with waste management to collect dedicated nappy bins
- Partner with reverse logistics company to collect dedicated nappy bins
- Nappy manufacturer may provide full service as part of Extended Producer Responsibility program
- New initiative to create employment for nappy collection



What's Needed

4 Composting technology/partners

Compostable nappies can regenerate soil through both large and small-scale commercial composting.

This would include commercial composting facilities such as:

- In-vessel composters ie: Xact, Ridan, Rocket.
- Windrow composting with dedicated nappy pile.
- Low tech community garden composting facilities operating at sufficiently high temperatures to treat human waste ie: CarbonCycle Compost technology currently in use in Auckland, New Zealand with compostable nappies. These facilities must have proper permits and expertise to operate.

Other regenerative technologies

Waste water treatment plants using digesters to create bio-solids from their sewage sludge hold incredible potential for regenerating nappy waste.

In the UK, there are over 7,000 wastewater facilities with 75% of the sewage sludge being anaerobically digested.¹⁴ Collaborating with these facilities should be explored as “the use of sewage sludge as a soil enhancer and fertiliser remains the environmentally favoured option, with around 80% being applied to agricultural land.”¹⁵

Although it is technically feasible to add compostable nappy waste to this process, this report does not offer an example of it in practice.



5 Supportive stakeholders including cities or local councils

Given the volume of the solid waste created by disposable nappies, cities and local governments are motivated to find solutions.

They play a key role in the following ways:

- Co-ordinate with waste regulators for all waste codes, permits or exemptions for initial pilots if required.
- Facilitate collaboration between potential local partners.
- Engage with their constituents to raise awareness of both the problem and their local solution to maximise success of any pilot project.
- Subsidise the waste collection and regeneration of compostable nappies in order to reduce both solid waste and landfill bound waste (or ocean pollution) in their area.

When local authorities are engaged in the larger picture, looking at waste streams, budgets and regulation through a macro lens, opportunities for circular solutions emerge.



What's Needed

6 Accounting for 'true costs'

Unfortunately, our current economic system does not take into account the 'true costs' of single-use disposable products as it does not account for any externalities. This then creates a false economy for consumers as plastic products remain artificially inexpensive to purchase.

Externalities not included in the current cost of disposable nappies include:

- Depletion of fossil fuels and risk of runaway climate change
- Greenhouse gas emissions from landfills and incineration contributing to global warming
- Ocean pollution and harm to marine life and ecosystems

Until these externalities are accounted for, plastic disposable nappies will continue to be less expensive than compostable nappies, ultimately decreasing mass adoption due to premium pricing for parents.

Governments can consider subsidies for a circular nappy solution in order to reduce solid waste, landfill bound waste, and/or ocean pollution.



Conclusion

Disposable nappies are an identified problem waste for most communities and governments around the world. Shifting to a circular economy solution for nappies solves this problem, while addressing United Nations SDGs 12, 13 and 14, and helps the move towards a waste-free economy.

As we have pointed out, there are 6 key elements for bringing a circular economy nappy solution to your area: proven compostable nappies; waste regulations; a retrieval plan or collection service for the used nappies; a regenerative technology; a commitment from local authorities to facilitate local collaboration and regulations; and accounting for true costs. Much of this can be facilitated through compostable nappy manufacturers who are committed to Extended Producer Responsibility, and by using the following Blueprint to better understand nappies in your community.

This report demonstrates the feasibility of a world where nappies shift from oil-based to renewable-based; from landfill-bound to resource generation; and from a burden on our children to an inspiration in how to re-imagine products in a circular economy.

Blueprint

There is not a single solution to nappy waste for every region of the world. Each geography will have its own requirements based on local regulations, existing infrastructure, and cultural practices.

Understanding the current system in your area is the first step to changing it. The following questions are designed to help identify the key players, the pain points, the financial flows and who bears them, in order to transition to a circular economy solution for nappies in your area.



Questions

Stakeholders

1. What are the main drivers for the exploration of a circular solution to nappy waste? i.e. commitments to reduce landfill bound waste, ocean pollution affecting tourism, etc.
2. Who are the key stakeholders?
3. How much nappy waste is being produced in your area annually?
4. How is that nappy waste currently being processed?
5. List all local authorities, and the departments within each, who deal with waste management in your area?

Economic Factors

1. What is the current cost of processing nappy waste in your area?
2. Who is currently paying for processing this waste?
3. What is the environmental impact of this waste?
4. Can there be a cost attributed to this impact?
5. What grants or funding is available to reduce plastic waste in your area?
6. What grants or funding is available to address UN SDGs 12, 13, or 14 in your area?
7. What do you need to demonstrate in order to access this funding?



Questions

Nappy Use

1. What is the most common form of nappies used in your area?
2. What is the average spend on nappies per week for families in your area?
3. Are subsidies currently available for reusable nappies?
4. Are subsidies available for reducing plastic waste that could be explored to offset the cost of compostable nappies?
5. If not, how can this be considered?

Waste Collection

FOGO (Food Organics Garden Organics)

1. Is there a FOGO collection service in your area?
2. Who is responsible for this collection program?
3. Who pays for this collection service?
4. Will new licensing be required for transporting used nappies (human waste)?
5. Are there additional requirements for compostable nappies to be added to this collection service?

General waste

6. How is household waste currently managed? Collection, or do households have a central drop off location?
7. Do citizens currently separate waste, i.e. recycling in different bags or bins?
8. Who manages the status quo?
9. Who pays for the status quo?
10. What licensing is required for the current system?
11. Can the current system expand to include compostable nappies (assuming parents' separate nappies from other waste into unique bags)?



Questions

Other waste collection

1. Are there other local partners who could be contracted for compostable nappy collection, i.e. reverse logistics companies, or other companies working in similar areas?
2. Is the nappy manufacturer willing to offer a delivery and collection service?
3. Is there the opportunity to create employment through a new nappy collection initiative?

Waste Regeneration

Leveraging Existing Infrastructure

Commercial Composting Facilities

1. What type of facilities are available in your area?
2. Do they have experience composting compostable nappies?
3. Are there any waste regulations that prevent the introduction of human waste?
4. If yes, how can this be overcome? I.e. Exemptions for trials.
5. Is additional testing required? If yes, contact compostable nappy manufacturer for more detailed technical information.
6. Are there gate fees?
7. How do these compare with the current nappy waste alternatives?
8. Who pays these fees?



Questions

Waste Regeneration Introducing New Infrastructure

Although collaborating with existing businesses and infrastructure is preferred, the nuances and circumstances in each geography may mean it isn't feasible. The good news is that a full circular solution to nappies is still a viable option, even if you are doing it alone.

Volume/Technology

1. Do you require a small scale composter, suitable for community groups (suitable for developing countries in hotter climates with plenty of garden waste)
2. Do you require large scale composter, which would service full cities?
3. Do you have the space and permits for operation?
4. Do you have qualified people to operate this technology?

Budget

1. What grants or funding is available to reduce plastic waste in your area?
2. What do you need to demonstrate in order to access this funding?
3. How does the cost of this technology compare to the current nappy waste expenses, including environmental impact, in your area.



Questions

Commercialising compost

1. What testing is required to confirm high quality compost certification?
2. Are there any regulatory restrictions on using human waste in compost in your area?
3. Is there the opportunity to monetize this waste as compost?
4. Is there an existing market for the compost or does it need development?
5. Are there existing companies in this space open to partnerships?

Given the above, is there a viable business model to implement a local composting solution in order to eliminate plastic nappy waste in your area?

Nappy Delivery Options

The delivery of new nappies is not an essential step in a fully circular solution, but it does offer benefits, and is therefore worth exploring. Once the composting partner and a collection system have been identified, it is worth exploring the viability of a delivery service.

1. Is there an opportunity to create an 'exchange' and combine the delivery and collection of new and used nappies?
2. What other deliveries are parents receiving to their door and is there a way to partner with this service?
3. Is there a central location where parents attend regularly that could serve as a delivery point (and/or a collection point)?



Case Studies



Case Studies:

Gaia's Nest Nursery, Tasmania, Australia

Gaia's Nursery in Hobart, Tasmania shifted to compostable nappies in an effort to reduce single use plastic in their centre and be more environmentally responsible. The centre has ten children in nappies and leveraged existing infrastructure to transition to a circular economy solution for nappies. The following pages outline the various steps taken by the nursery to make the transition, along with data on their impact.

Gaia's Nursery – Understand the Status Quo

Collection Questions

Is there currently FOGO in your area	Yes
Who is responsible for this program?	Veolia Waste Management
Who pays for this service?	Gaia's Nursery
Will new licensing be required for transporting used nappies (human waste)?	No - Veolia has license
Are there additional requirements for compostable nappies to be added to this collection service?	No - Existing certifications from nappy company sufficient

Waste Regeneration Questions

Is there FOGO in your area?	Yes - City of Hobart offers FOGO
Is the current technology willing to accept compostable nappy waste	Yes - City of Hobart and the windrow composting facility are willing to accept their brand of compostable nappies
Are there any waste regulations that prevent the introduction of human waste into the technology?	No
Will gate fees be applied to nappy waste?	Yes – Gaia's Nursery will pay the higher fee for the FOGO
Is additional testing required?	No – Compostable nappy manufacturer has proven to exceed Australian Composting Standard AS4544
Does the output require certification?	Yes - City of Hobart conducts ongoing tests for their compost
Is the output valuable in your area?	Yes - City of Hobart is selling this compost (containing dirty nappies) for AU\$75 m3

Delivery Questions (optional)

Is there an opportunity to create an 'exchange' and combine the delivery and collection of new and used nappies?	No – Veolia garbage truck is unable to deliver new nappies
Can Gaia's nursery order certified compostable nappies online and have them delivered?	Yes

Gaia's Nursery – Implementation Checklist

Collection Check List

Confirm collection partner or process (existing partner, new service or use centralised drop off point)	✓ Veolia collection
Obtain relevant permits if required	✓ Veolia
Manage operations and logistics for collection	✓ Veolia
Establish business model and economic viability of this process ie: is it profitable or will it require subsidies?	✓ Veolia

Waste Regeneration Check List

Confirm technology and processing partner	✓ Windrow compost through the City of Hobart
Obtain relevant permits if required	✓ City of Hobart
Create new output (ie: compost)	✓ City of Hobart
Obtain relevant output permits if required	✓ City of Hobart
Manage output distribution ie: sell compost	✓ City of Hobart
Establish business model and economic viability of this process	✓ City of Hobart

Nappy Delivery Check List

Confirm delivery partner	✓ Online store
Manage operation & logistics for delivery & warehousing etc.	✓ Online retailer
Establish business model and economic viability of this process ie: is it profitable or will it require subsidies?	✓ Independent online retailer



30,000
nappies diverted from landfill



50%
reduction in overall landfill waste for nursery



7 tons
waste diverted from landfill



4.3 tons
avoided in greenhouse gas emissions



3.5 tons
of compost created



\$75/m3
prices for the AS 4454 certified compost

“I would highly recommend these 100% compostable nappies to any Early Childhood Education centre who want to do the best for the children in their care.”

Michelle Beakley, Owner, Gaia's Nest Early Childhood Education & Care

City of Bega, NSW, Australia

The city of Bega identified disposable nappies as a problem waste and took the initiative to conduct a compostable nappy feasibility study. They worked with a certified compostable nappy manufacturer and brought together their local council, waste collectors, FOGO, facility, and the CSIRO (Commonwealth Scientific and Industrial Research Organisation) for testing.

City of Bega – Understand the Status Quo

Collection Questions

Is there currently FOGO in your area	Yes
Who is responsible for this program?	City of Bega
Who pays for this service?	Households
Will new licensing be required for transporting used nappies (human waste)?	Exemption for trial
Are there additional requirements for compostable nappies to be added to this collection service?	Exemption for trial

Waste Regeneration Questions

Is there FOGO in your area?	Yes – static pile windrow
Is the current technology willing to accept compostable nappy waste	Yes. A dedicated static pile was established and compared against a control pile for certification.
Are there any waste regulations that prevent the introduction of human waste into the technology?	Exemption for trial
Will gate fees be applied to nappy waste?	Yes
Is additional testing required?	Yes – city will conduct output testing
Does the output require certification?	Yes – city will conduct
Is the output valuable in your area?	Trial will determine output value

Delivery Questions (optional)

Is there an opportunity to create an 'exchange' and combine the delivery and collection of new and used nappies?	Not for trial.
Can parents order certified compostable nappies online and have them delivered?	Yes

City of Bega – Implementation Checklist

Collection Check List	
Confirm collection partner or process (existing partner, new service or use centralised drop off point)	✓ Council collection
Obtain relevant permits if required	✓ N/A for trial
Manage operations and logistics for collection	✓ Existing
Establish business model and economic viability of this process ie: is it profitable or will it require subsidies?	✓ Existing so no incremental expense

Waste Regeneration Check List	
Confirm technology and processing partner	✓ Windrow compost through the City of Bega
Obtain relevant permits if required	✓ City of Bega
Create new output (ie: compost)	✓ City of Bega
Obtain relevant output permits if required	✓ City of Bega
Manage output distribution ie: sell compost	✓ City of Bega
Establish business model and economic viability of this process	✓ City of Bega

Nappy Delivery Check List	
Confirm delivery partner	✓ Online store
Manage operation & logistics for delivery & warehousing etc.	✓ Online retailer
Establish business model and economic viability of this process ie: is it profitable or will it require subsidies?	✓ Independent online retailer



13,800
nappies diverted from landfill



3 tons
waste diverted from landfill



2.5 tons
avoided in greenhouse gas emissions



1.6 tons
of compost created

ABOUT THE ELLEN MACARTHUR FOUNDATION

The Ellen MacArthur Foundation was launched in 2010 with the aim of accelerating the transition to the circular economy. Since its creation, the charity has emerged as a global thought leader, putting the circular economy on the agenda of decision-makers around the world. The charity's work focuses on seven key areas: insight and analysis; business; institutions, governments, and cities; systemic initiatives; circular design; learning; and communications.

Further information: www.ellenmacarthurfoundation.org | @circulareconomy

ABOUT THE CIRCULAR ECONOMY

The current 'take, make, waste' extractive industrial model relies on the consumption of finite resources. The circular economy offers a positive way forward by redefining growth to focus on society-wide benefits. It entails redesigning material flows and production systems to build economic, natural and social capital. Underpinned by a transition to renewable energy sources, the circular economy is built on three principles: design out waste and pollution; keep products and materials in use; and regenerate natural capital.

The circular economy is gaining attention thanks to the opportunities it offers businesses to capture new value from existing operations and resources, for example by redesigning products and business models, building new relationships with customers, and harnessing technology to increase the utilisation of assets.

[View the animation](#)

[Listen to our podcast](#)

[Learn more about the circular economy](#)

ABOUT THE ELLEN MACARTHUR FOUNDATION NETWORK

The Ellen MacArthur Foundation's Network is the transition to a circular economy. Creating a systemic shift of this nature will take pressure from all actors: businesses, governments, educators, innovators, investors, and beyond. The Foundation works with the world's leading and most influential organisations with transformative potential, across multiple sectors and industries, to demonstrate what is possible.

Further information: [Our Network](#) | network@ellenmacarthurfoundation.org

ABOUT COLLABORATIVE PROJECTS (CO.PROJECTS)

Co.projects are opportunities for formal pre-competitive collaboration between members of the Ellen MacArthur Foundation network. They are driven by members, for members, and their focus can range from research initiatives to pilots and toolkits. Co.projects leverage the network with the aim of exploring opportunities and overcoming challenges commonly faced by organisations making the transition to a circular economy, and which organisations may not be able to address in isolation.

