



Think ahead.

# Paper hand towel circularity made possible

A review of technology innovations  
and the incremental path to create  
better and sustainable washrooms





## Preface

In general, the paper sector enjoys high recovery and recycling rates when compared to other materials. Whether the individual product type is office paper, newspaper or cardboard, there is a well-established and high functioning recycling stream. In fact the total amount of recycled paper is 66,2% in the United States<sup>1</sup> and 72% in Europe<sup>2</sup>.

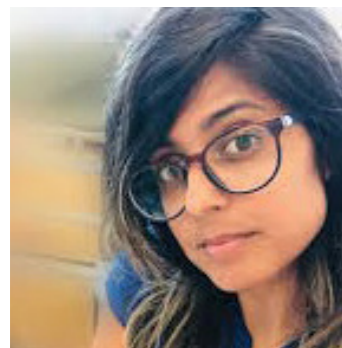
There are exceptions to this waste reduction success story. One example is paper hand towels, which remain a fairly untapped opportunity for a circular business model. Today, less than 1% of all paper hand towels are recycled. The predicament stems from the substrate and the wet-strength agent added in the manufacturing process of paper hand towels to make its job possible – essential for drying hands in a hygienic and efficient way. This agent requires that paper hand towels undergo a separate recycling process from other paper-based materials, making recycling a costlier proposition. Recent technical innovations, however, have advanced the recovery and recycling rates of other paper materials. What if it were possible to leverage these advancements to alter and renew the paper hand towel recycling story?

With this aim of recovering resources and putting paper fibers back into the product loop, Tork, a brand of the global hygiene company Essity, has pioneered Tork PaperCircle® – the world's first recycling service for paper hand towels.

This whitepaper reviews the incremental path taken to create a circular business model for paper hand towels. Its focus is on the careful and mindful management approaches adapted, along with new product design that enabled hygiene and sustainability to work hand-in-hand in the washroom for better well-being globally.



# About Tork and Essity



**Charishma Kothari,**  
Marketing Director Services  
and Solutions, Essity

Tork, an Essity brand, is a leading global professional hygiene brand aiming to enable a sustainable and circular life away from home.

Taking the leap into circular models poses a challenge for any company as it requires rethinking product design, reverse logistics, business model innovation and cross-sector collaboration. Despite those hurdles, circular business models can also lead to better, more sustainable products, services that create value to B2B and B2C customers and society.

We want to share our strategies on taking back paper hand towels to create safe and circular washrooms. Our strategy is a pragmatic approach utilizing new innovations along with incremental objectives and goals to reduce negative climate impact.

As members of the Ellen MacArthur Foundation, we know that developing our business with the help and inspiration of others will serve to improve company, products and services. Essity already has reduced its carbon footprint and we are on track to fulfill our approved Science Based Targets in line with the Paris Agreement.

Our pursuit of circular business models supports our aim to contribute to the climate goals of the Paris Agreement, and as a Global Compact signatory our aim towards the UN Sustainable Development Goals. Our focus is on UN Goals 12, 13, 15 and 3 which focus on responsible consumption and production, climate action, life on land and building partnerships.

It is our hope that the findings from our pursuit of circular business models – both the successes and the remaining challenges – can serve as inspiration and guideposts for cross-sector partners, such as sustainability, purchasing, facility management, and waste management.



**Åsa Degerman,**  
Senior Product Manager,  
Services and Solutions, Essity

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# Executive summary

**Today, too many resources are still not being recovered and turned into new usable products, often due to complexity inherent in the recycling process or a lack of well-functioning waste systems.**

**For example, only about <1% of paper hand towels are recycled. Hence, there is a lot of untapped potential for companies active within Professional Hygiene in putting paper hand towels into a circular business model – turning waste into a new resource.**

This astonishing low statistic stems from the wet-strength agent added in the manufacturing of paper hand towels that makes its job possible – the ability to dry hands in a hygienic and efficient way. This wet-strength agent requires that paper hand towels undergo a separate recycling process from other paper-based materials. That makes recycling a much costlier proposition. Recent technical innovations, however, have advanced the recovery and recycling rates of other paper materials. That is why we believe the time is right to partner up with other actors to support implementation and sharing knowledge and proving the benefits of new circular models with Life Cycle Assessments.

**Key success factors in developing circular business models include:**

- **Define goals early in the process**
- **Establish cross-functional work streams within the organization**
- **Full support of the board and executive leadership**

In this whitepaper, you will get more insights for your company to utilize as you get involved and start discovering circular business models for your products and services. We'll also look at how we see circular business models developing in the future.

# Glossary

## Circular economy

An economy wherein businesses apply a circular way of thinking into the business model. This paradigm shift means rethinking production with consideration to the 'after-use' of product and focus on its continual recovery and re-use to minimize environmental impact to achieve the goal of zero resource waste.

## Circular business models

An approach to conducting business where a product is designed, manufactured and distributed into the marketplace with a sustainable plan for post-use recovery of its waste to create a new raw material resource.

## CO<sub>2</sub>e

Carbon dioxide equivalents (CO<sub>2</sub>e) convert the climate impact of greenhouse gases into one unit of measure to derive total carbon footprint. Greenhouse gases, such as carbon dioxide (CO<sub>2</sub>), methane and nitrous oxide, have varying effects on the climate.

## Sustainability

Sustainability means meeting our own needs without compromising the ability of future generations to meet theirs. This includes social, environmental, and economic needs.

## Sustainable development goals

These goals are central to the United Nations Agenda 2030, which is a globally recognized framework to achieve a better and more sustainable future. This framework addresses the global challenges we face, including poverty, inequality, climate change, environmental degradation, peace and justice.

## Linear economy

The most common way of conducting business and producing goods, focusing on "take-make-dispose" of resources without designing or planning for recovery of those used.

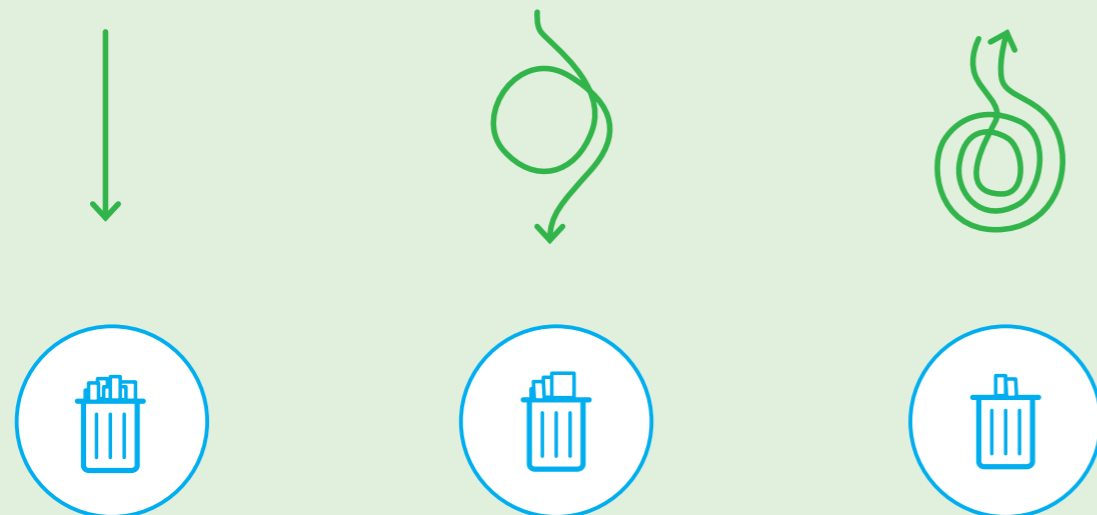
## Recycling economy

Recycling economy refers to a model framework where product waste is recovered post-consumer use. The business model does not consider recovery or recollection of the resources for their own subsequent production.

### Linear Economy

### Recycling Economy

### Circular Economy



# Doing business differently

Climate change and resource inefficiency, combined with rapid urbanization and population growth, have created an increased demand for products in the face of raw commodity constraints. As a result, governments, organizations and commercial enterprises alike are seeking new approaches to create a more sustainable and circular society.

The global economy requires emerging business models that leverage new technologies to optimize recovery of consumed raw materials for reuse in new products. The non-profit organization, the Ellen MacArthur Foundation<sup>3</sup>, states that a transition to a circular economy would decrease carbon dioxide (CO<sub>2</sub>) emissions by 48% by 2030. The linear industrial model of “take-make-waste” is no longer viable.

Time is of the essence and the manufacturing capability exists to adopt circular business models without compromising on product hygiene, functionality, quality, safety and economic value.



# About Circular Economy

# Circularity put into practice

Sofia Ritzén, professor at KTH Royal Institute of Technology, studies innovation breakthroughs and how they are incorporated into organizational frameworks. In 2017, she researched how the theoretical concept of circular economy can be implemented successfully in practice. Key success factors identified in Ritzén's research included:

- Perceived importance of radical innovation of the business model
- Incorporation in all parts of the value chain
- Cooperation among leaders to distribute and reduce risk

**“Key success factors for circular business models include perceived importance of radical innovation of the business model, incorporation into all parts of the value chain, and cooperation between leaders to distribute and reduce risk.”**

## Redefining the business model

Central to transitioning to a circular business model is redefining the core business value proposition – both in terms of identifying value attributes, and what parts of the value chain will be impacted by the new definition. Typically, the redefined value proposition broadens value from solely an economic perspective to encompass social and ecological factors, as well.<sup>8</sup>

## Circularity to gain new customers

Companies are adopting circular business models both to address a changing regulatory landscape and to appeal to a growing consumer base that factors sustainability in their purchasing decisions. In fact, both B2B and B2C customers are demanding sustainable alternatives amid growing sensitivity toward the planet's limited resources. Working and excelling in circularity can lead to new business. Moreover, vendor proposal processes often contain sustainability as a preferred or required business attribute. Various common circular business model strategies include increasing the proportion of products recycled, designing products with recycling in mind, as well as minimizing waste and re-using materials.

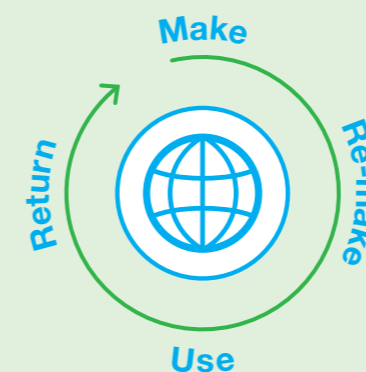
The core of a circular economy is to redesign the traditional, linear production and consumption processes of “take-make-waste” and bend that shape into a closed, circular loop. The end-of-life concept is replaced with recovery of consumed materials for reuse in new products.<sup>4</sup>

Aiming to accelerate the transition to a circular economy, the [Ellen MacArthur Foundation](#) is one of the most prominent voices for circularity. According to the Ellen MacArthur Foundation, a circular economy is based on the principles of designing out waste and pollution, keeping products and materials in use, and regenerating natural systems.<sup>5</sup>

The [United Nations](#) (UN) defines circular economy as an opportunity to “substantially reduce waste generation through prevention, reduction, recycling and re-use”.<sup>6</sup> They identify and define circular economy as a tool for accelerating the implementation of the 2030 Agenda with focus on UN Sustainable Development Goals 12, 13, 15 and 17 on responsible consumption and production, climate action, life on land and building partnerships.

In 2015, the [European Union](#) (EU) introduced the Circular Economy Action Plan. It was updated in 2020 with targets including the recycling of 65% of municipal waste by 2035 and 85% of all paper and cardboard by 2030. The plan defines circular economy as a system where “the value of products, materials and resources is maintained in the economy for as long as possible.”<sup>7</sup>

## Circular business model

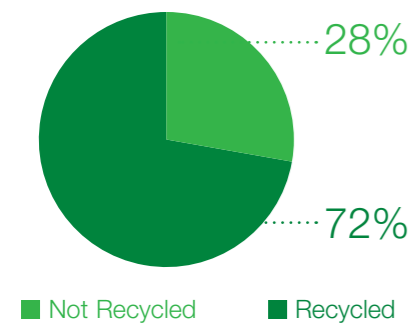


## Linear business model



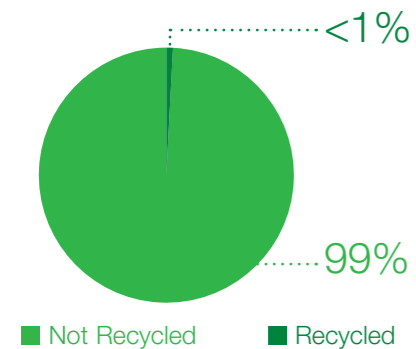
# The potential of recycling paper hand towels

Amount of recycled paper and cardboard



Source <sup>9</sup> - CEPI

Amount of recycled paper hand towels



Paper hand towels remain one of the most hygienic method of drying hands. Yet, they remain an untapped resource when it comes to recycling and recovering paper. Less than 1% of paper hand towels are recovered for recycling currently. The wet-strength composition required for paper hand towels to do their job mandates a separate dissolving process to remove the wet-strong agent before the paper fibers can be recycled. This extra and separate step apart from other paper types makes recycling paper hand towels a difficult and costly proposition.

In contrast, other types of end-use paper, including both news and office paper, as well as carton and cardboard are recycled on broad scale with great utility. These paper materials can be recycled up to seven times. According to CEPI (Confederation of European Paper Industries) approximately 72% of all paper put to market in CEPI member countries was collected and recycled into new paper products and 54.6% of all paper and board produced during the same time period was based on recycled fibers<sup>9</sup>.

In a normal office, paper hand towels account for up to 20% of all generated waste. An office with 3,000 employees will use about 12 tons of paper hand towels per year. Three thousand people, working 230 days per year, washing their hands three times per day amounts to 2,070,000 hand washes. Two paper hand towels per wash equates to approximately 12 tons of paper hand towels that could be recycled to reduce the CO<sub>2</sub>e by almost 10,000 kg.

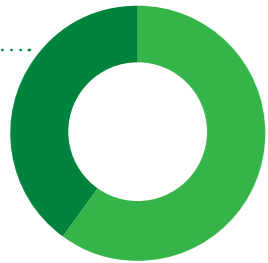
**Thanks to new technological developments, there is a now a path for paper hand towels to join the paper sector's recycling success story.**



# Circulating paper hand towels

By recycling paper hand towels, we can reduce the CO<sub>2</sub>e by

# 40%



Results of a Life Cycle Analysis (LCA) conducted by Essity Tork and verified by IVL, Environmental Research Institute, Ltd 2017, where the avoided processes have been taken into account.

The perception of paper hand towels as waste is prime for change. This highly hygienic product is ready to join the resource recovery business model like other paper products. Recycling paper hand towels offers the potential to reduce CO<sub>2</sub>e by 40% compared to current waste handling systems such as incineration or landfill<sup>10</sup>.

Hygiene and health company Essity has taken a lead role to change the paper hand towel recycling and recovery rates. We launched Tork PaperCircle – a circular service designed to recycle our Tork paper hand towel brand and turn the consumed materials into new paper hand towels and other tissue products.

Tork PaperCircle is designed to be easy and intuitive for all stakeholders. Here's how it works:

1. Visitor throws the used paper hand towels into a separate bin. Signs, developed with inspiration from behavioral science, facilitate the separate disposal.
2. Cleaning personnel emptying trash keep the paper hand towels collected in the Tork PaperCircle bin separated on the cleaning trolley and in the facility recycling room.
3. The paper hand towels are collected by Tork's recycling partner and brought to the local Essity mill.
4. The recovered paper hand towels are recycled and put back into the loop as new paper hand towels and other tissue products.

Three elements have been key to Tork PaperCircle working in practice:

1. The development of technology that makes it feasible economically to recycle wet-strength embedded paper
2. Insights into how to encourage recycling in human behaviour-nudging signage
3. Strong collaboration with dedicated partners

## The new paper hand towel circular business model



## The Tork PaperCircle recycling process – in detail

1. Consumed towels delivered to the Essity paper mill are mixed with water in the pulper, then treated in a dedicated dissolving process to deactivate the wet strength agent.
2. The dissolved material is stored at high temperature for a defined period to ensure a hygienically safe product.
3. Recovered fibers are separated and combined with other pulp at the mill – and turned into new paper hand towels and other tissue products, depending on current country legislation on use of recycled materials.

**“By recycling, we can lower our carbon footprint, and the buildings involved generate about 20% less waste. Tork PaperCircle establishes us as a recycling pioneer among German companies.”**

**Dirk Middelmann**  
Commerzbank

## Recycling process of paper containing wet-strong agent



To recycle the paper hand towels, they are mixed with water in the pulper...



...and treated in a dedicated dissolving process to deactivate the wet strong agent



The dissolved paper hand towels are stored at high temperature for a defined period of time for a hygienically safe product



Then the fibres are separated and mixed in with other pulp at the mill



A tissue machine turn the recycled paper hand towels into new tissue products



## Our experience

### What does it take for a company to take on a more circular approach to their business?

Susan Iliefski-Janols, Vice President, Sustainability Products & Services at Essity, says that several factors are key to getting started with exploring and developing a circular business model:



- Embrace a holistic and life cycle perspective when introducing new business models
- Maintain or improve the desired functionality of a product or service for the user
- Work closely with users, customers, their facility and waste management partners in the value chain, as well as with involved authority teams to secure all stakeholder perspective and involvement
- Work with internal cross-functional teams to secure creativity and future innovations
- Integrate recyclability as early as possible in the development of new products and packaging
- Identify the content of your used products to optimize secondary materials
- Simplify the recycling for the consumer or customer
- Set up a cost-efficient solution to move waste items from the customer to the receiving recycling process in the production unit or to other potential users of secondary materials
- Highlight the environmental and financial benefit for all stakeholders

#### The main challenge

“But the main challenge,” says Susan, “is to view the current business with new eyes and identify how to change the value chain – what you source and how you design and produce, including the choice of secondary materials in new products.”

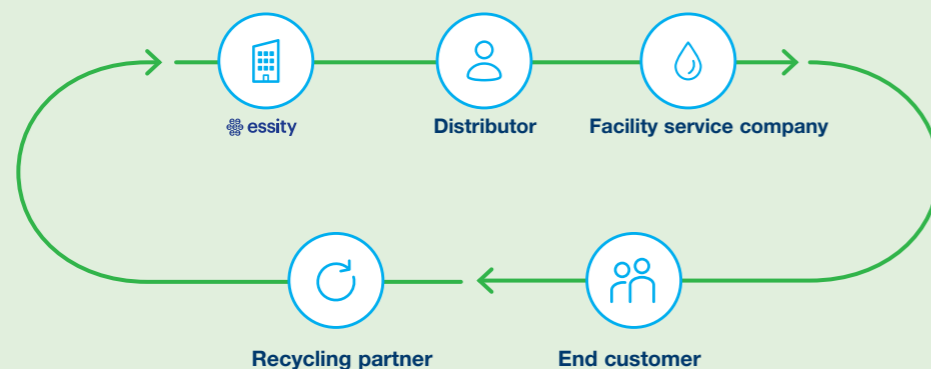
She adds that another challenge is to recycle the correct way. “Whatever we can do to facilitate recycling for customers and consumers is positive, while also continuously challenging ourselves as to how we develop products and services,” Susan explains.

For some of Essity’s products – such as personal care products with high demands for secure health and hygiene – it’s more difficult to use recycled materials or to recycle the used products due to contamination of body liquids and potential pharmaceuticals.

**“We live in a resource-constrained world, where more and more people share one planet,”** she adds. **“To increase recycling of all kinds of products, the environmentally sound packaging and creation of secondary raw materials is an effective way to generate more resources and lower our environmental impact upon the planet.”**

## Partnerships for circularity

The design and set-up of a circular, closed loop system demands involvement from stakeholders and initiating partnerships along the full recycling value chain.



## Enabling recycling through behavioural change and partnerships

For Essity, the transition to sustainability requires that other stakeholder groups, such as paper mills, distributors, facility managers, logistics, waste management and the recycling partner come together to identify viable opportunities for positive environmental impacts.

#### Changing behavior in the washroom

Paper hand towels require a separate recycling process from other paper materials. Our approach to an efficient resource recovery design starts in the washroom. The goal is to separate used products from the beginning by encouraging consumers to place used paper hand towels in a separate, designated bin.

By adopting behavioral science techniques, we “nudge” consumers to help the recycling program by designing a surrounding that promotes desired behaviors – either by making the wanted action the easy and intuitive one, or by making the consumer stop and reflect on behavior before action.

Our washroom design environment includes signage and designated bins. The signage informs visitors on the goals of the Tork PaperCircle service and the benefits of recycling paper hand towels, in general. If consumers learn that paper hand towels can be recycled when thrown in the correct bin, they’re more apt to conform to perceived social norms.

#### The importance of stakeholder collaboration

Implementing a circular business model requires collaboration, dedication and patience among stakeholders throughout the supply chain. The Tork PaperCircle service implementation found it essential to partner with both facility management companies and waste/logistics companies.

Facility management staff are crucial to the successful, separate collection of used paper hand towels in the washroom. They are front gatekeepers to the entire closed loop process. A training program that covers the goals, objectives and work streams of Tork PaperCircle was key to encouraging work modifications to close the loop in the washroom.

The recycling company that collects the used product from the facility also needs to understand the program’s goals and objectives as it updates its work processes to include this new recycling waste stream.

**“A nudge alters people’s behavior in a predictable way without forbidding any options or significantly changing their economic incentives...”**

# Our insights, approach and learnings

With a goal of recovering resources and eliminating material lost from the product cycle loop, Essity has pioneered Tork PaperCircle, the world's first recycling service for paper hand towels. The service started out as a pilot initiative in collaboration with customers and partners. It has now evolved into an award-winning, in-demand service offered to customers in several European markets, with more markets scheduled to implement it in the coming years.

Below are some key findings from implementing Tork PaperCircle – a service that creates a circular business model for paper hand towels.

“Inspira has been offering facility services with an environmental certification for more than 15 years and continue to explore new, innovative solutions. The partnership that turned into Tork PaperCircle is a part of that exploration and it feels really good that we can contribute to better waste management.”

**Mari Tuveson**  
Business area manager  
Inspira



## 1. Define goals early on

Early formation of desired goals starts the process of changing company mindsets.

The project started out with three initial goals: 1) Develop solutions for waste management and sustainability 2) Minimize impact on the environment while maintaining profitability, and 3) Develop a service that supports the sustainability ambitions of the customer.



## 2. Involve multiple functions in the development phase

Mixing competences within the innovation team reinforces that the final solution will address diverse needs and perspectives.

The project team was composed of representatives from marketing, sustainability and engineering as part of the innovation unit. Later, the team benefitted from customer-centric perspective. The team also had access to a steering committee, offering relevant expertise as needed.



## 3. Get the board on board

Engagement from leadership and steering committee drives continuous input and adaptability.

A long-term perspective on success and a viable business case was secured by engaging several company divisions. It also supported tolerating the risks of running a new service, despite no immediate financial benefits.



## 4. Partnerships for knowledge

It is crucial to gain input from those with know-how and have prior experience.

During the development phase, Essity joined the Ellen MacArthur Foundation, a network for sharing knowledge and putting ideas of circular economy into practice. This membership turned out to be a crucial move for Tork PaperCircle, as it provided access to knowledge from other businesses, foundations and organizations specialized in the circular economy.



## 5. Partnerships for implementation

Successful implementation is possible when you involve customers and partners with the same vision.

Tork worked hard to identify and engage customers and logistics partners that wanted to pilot the service. Partnerships were initiated with customers that shared the same ambition of working towards sustainable development and activities. The partnerships provided valuable input, expertise and feedback to the innovation funnel.



## 6. Creating a test environment

Identify potential gaps and challenges early in testing to create a model that works in the real world.

Success for Tork PaperCircle required several behavior modifications along the product cycle: Clients needed to adapt the washroom environment. Cleaners had to be re-trained to handle the paper tissues. Washroom visitors required instruction on how and why they needed to put the paper towels in a separate bin. Flexibility and working in an agile manner supports adjusting to unexpected, yet valuable teachings that naturally occur when rolling out an innovation to customers.



## 7. Prove circularity

Put the facts on the table and document how the circular business model contributes to a more sustainable society.

Early on, a third-party certified Life Cycle Assessment (LCA) was conducted to verify that the value added in terms of reduced climate impact could be scientifically proven. Without this step, it would have been difficult to present the tangible and credible results to customers and partners. It also has served as a valuable tool for communication and gaining business.



## 8. Connect and engage public administration

Rules and regulations define the prerequisites.

The handling and collection of waste is, in some markets, the responsibility of local governments. In such cases, the aim to handle a specific fraction of waste requires an exemption from existing rules. Therefore, partnerships with local governments is a key success factor.

“Folksam has been working with environmental- and sustainability challenges for decades and sustainability is incorporated in our overall way of business. It is great that we, through Tork PaperCircle, can start to work with circularity in yet another area. The service makes it possible for our employees and visitors to easily recycle their used paper hand towels and contribute to circularity.”

**Karin Stenmar**  
Head of Sustainability  
Folksam

# What actions we take in responsibility – today and in the future

**“With this initiative, we take another big leap towards sustainable solutions with circular material flows. We move from considering paper hand towels as waste to value them as a resource that can be used again.”**

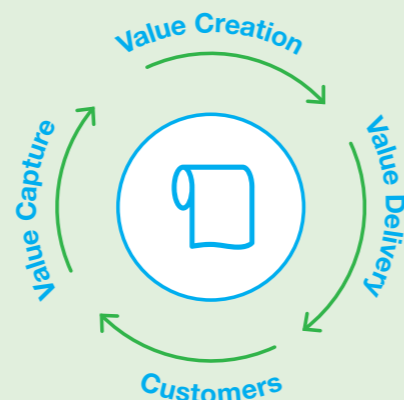
**Robin Pehrsson**  
Environmental Strategist  
Ångelholms Kommun

Sustainability is a core business driver for Essity and its brands, including Tork. For decades, we have addressed product environmental performance and resource consumption. As a result, we have set a two-prong goal that by 2030 we will: a) reduce the environmental footprint of our solutions and b) all our production unit waste will have material and energy recovery programs in place.

Today, Essity is integrating circularity into its business model in a variety of ways, including:

- Establishing responsible manufacturing material sourcing for circular material flows, e.g., using renewable and recyclable raw materials
- Creating more efficient production to reduce climate impact
- Introducing solutions that enable customers and consumers to minimize waste, e.g., designing products made from fibers that can be re-used and recycled
- Developing new programs to enable sustainable business collaboration with our partners

Tork PaperCircle is one such service that helps our customers create more circularity. Tork PaperCircle enables companies to reduce waste by 20%<sup>11</sup> and decrease emissions of CO<sub>2</sub>e resulting from paper hand towels by as much as 40%<sup>12</sup> compared to other after use management processes.



# Let's take action on circularity

Meeting the challenges of sustainability today and tomorrow requires innovation and a new business paradigm. Instead of a traditional profit and loss balance sheet, companies transitioning to circularity expand value to a triple-bottom line – a bottom line that factors in the social, environmental, and economic benefits that serve to fulfill the UN's Sustainable Development Goals.

It's true that the complexities inherent in transitioning to more regenerative business models will vary among individual material loops. For some, the re-use of consumed materials is not yet pragmatic because current reclaiming processes aren't efficient enough to justify the economics or the environmental benefits.

The good news is that the incremental path to "endless resourcefulness" exists. With mindful management on priorities, the viable path towards a circular business model couldn't be clearer:

- Implement cleaner production processes
- Generate resource productivity improvements, e.g., increase the performance and sustainability of materials
- Reduce raw material consumption
- Prolong the product lifecycle

## The challenge

At Essity, we are moving from a system of waste to identify, recognize and take responsibility for the careful management of hygiene products we introduce into the marketplace. Realizing the untapped potential in paper hand towels is just one of the many steps we are taking to create a more circular and sustainable future. We are working at identifying and testing how we can apply our circular approach to other streams (for example paper cups) to ensure that we reduce, reuse and repurpose resources in an efficient way.

By sharing our knowledge and experience, we aspire to remain on the forefront of the transition to a circular economy. Collaboration, outreach and creating partnerships with other companies, organizations and governments underpins our sustainability efforts and is crucial to impact at a meaningful scale.



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## Memberships and credentials



Signatory of the UN Global Compact



Member of Ellen MacArthur Foundation



Targets for reduction of greenhouse gas emission approved by the Science Based Targets initiative



Tork PaperCircle had been recognized by the European Parliament (European Paper Recycling Council) as a unique denominator for how sustainability and industrial innovation can create impact.

## Awards



"We are really impressed by Tork PaperCircle. It is a very ambitious project and the first of its kind, which offers a recycling service for paper hand towels in the clients office buildings. [...] The project involves local partners and we believe the service can evolve the whole industry."

Michelle Marshall, Chairman of the Jury



Tork PaperCircle was one of the finalist at the Circulars 2019 in the category "Multinational".

The Circulars offers recognition to individuals and organizations that make a notable contribution to driving circular economy forward.

## Sources

- 1) <https://www.paperrecycles.org/statistics/paper-paperboard-recovery>
- 2) <https://www.cepi.org/key-statistics-2019>
- 3) Ellen MacArthur Foundation, 2020
- 4) Kirchherr et al. (2017), whose definition is based on 114 definitions of the concept.
- 5) Ellen MacArthur, 2020
- 6) United Nations, 2020
- 7) European Commission, 2015
- 8) Ritzén 2019
- 9) CEPI, 2020b
- 10) Results of a life cycle analysis (LCA) conducted by Essity Tork and verified by IVL, Swedish Environmental Research institute Ltd, 2017, where the avoided processes have been taken into account.
- 11) Based on results from Tork PaperCircle pilot customers in Germany and The Netherlands
- 12) According to a Life Cycle Assessment (LCA) conducted by Essity Tork, verified by IVL Swedish Environmental Research Institute in 2017, where the avoided processes have been taken into account.



Think ahead.

Are you ready to join our circular collaboration?

For additional information regarding our position on sustainability and further information regarding Tork PaperCircle, please join us on Facebook, Twitter and LinkedIn or view our websites:

[essity.com/sustainability](https://essity.com/sustainability)  
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