



### Paper, Germany – Circular System Characteristics

#### System characteristics:

Paper is a traditional system that has long been accepted by the population. Recycled paper is highly accepted due to its good quality and less energy consumption. Each year, 22.1 million tons of virgin paper get produced, whereof 17.4 million tons are used as recyclate. Research is done to extend the life cycle of fibers; life cycle assessment exist since 2000.

<u>Availability/Role of recycling technology:</u>

- Recycling rate 78% (technical cycle), **technical maximum reached** due to natural fiber degradation, 3–5 paper loops, renewable, C2C technology available.
- Predominant separation pulp and paper.
- Contamination through inks.

#### <u>Maturity of market:</u>

- Long established systems of waste collection, sorting, preparation.
- Stock market, stakeholder: Polypoly, private legal form.
- Competitive manufacturing markets: 91 companies, highly digitized.
- Competitive consumer markets (graphics, packaging, sanitary, specialties), not digitized.
- Competitive recycling markets: 360 for sorting, 53 for recycling, highly digitized.

#### Policy intervention type/regulations/directives:

- Environmental monitoring, sustainable forest and timber management.
- Collection and recycling systems regulated by law.
- MOMENTUM: forest decline in 1970s/1980s, 1978 certified standard "Blue Angel" → transformational phase 10–15 years.

78% waste paper response rate 12% loss by waste paper processing

Production 22.1 Mio. t with a waste paper quota of 60%

Arithmetical use of paper per head/year 243kg 15% loss by use of tissue paper



### SWOT Paper

<ul> <li>Closed loop</li> <li>Technical cycle, 79% recycling rate at maximum</li> <li>Established systems</li> <li>Certified standards</li> <li>Scientific development program</li> <li>Long history of paper sorting</li> </ul> Strength	<ol> <li>Live cycle of fibers limited to 3–5 loops</li> <li>High energy use</li> <li>Overexploitation of forests</li> <li>No recycling for hygienic papers</li> <li>Contamination by print colors needs separate recycling technology</li> <li>Weakness</li> </ol>
Opportunity	Threat
. C2C technology available 2. Sustainable forest management 3. Water saving	<ol> <li>Substitution by other material (i.e., plastic packaging)</li> <li>Material mix (i.e., EPS in cardboard boxes) leads to downcycling or high sorting / recycling costs</li> </ol>

### 1. <u>Nature Science</u> Wood as a renewable source for paper.

## **2.** Envisioning Paper invention in 105 AD in China.

## **3.** Investment Paper as instrument for knowledge capture, hygienic paper, packaging paper and post starts to spread over the world in 610 AD.

PHE FIFTH BOOK OF MOSES, CALLED DEUTERONOMY.

## **4**. <u>Rocket Science</u> Johann Gutenberg (man of the millennium in 2000) n Gutenberg Iman of the minet of the stablishes book printing in 1450 AD. and it contains his dying exhortations to Israd: and he are the first of the second se stelle, were employed in delivering and committee in working the second guide and terrent here to his people, with the various methods he couplined for the house have a destance

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### 5. <u>Historic Event</u> Forest decline in 1970s and 1980s.



# Image: Weight of the second second



国立研究開発法人

森林研究·整備機構











**8**. <u>Business Innovation</u> The system has become manageable through a network of players.







FIBRE based solutions













vdp

PITA

Swedish Forest Industries

#### 9. Life Cycle System has evolved. Technical cycle is working. Paper recycling has reached technical maximum.

#### 10. Forecast Due to e-commerce, paper demand is forecasted to remain and even rise.



### Thank you for your attention

Eveline Lemke Im Schülert 13 56551 Niederzissen <u>e.lemke@thinking-circular.com</u> <u>www.thinking-circular.com</u>



# Thinking Circular