

The quality of paper for recycling for the competitiveness of the paper chain in Europe's circular economy

13rd Octobre 2017, MIAC in Lucca

“Quality of paper and board for recycling and future challenges”

L. Tempel (PTS Heidenau)

FIBRES & COMPOSITES + PACKAGING & CONFORMITY + PRINT & FUNCTIONAL SURFACES + INNOVATIVE MEASURING + MATERIAL TESTING & ANALYTICS

2

Papiertechnische Stiftung

Fibre-based solutions for successful innovations




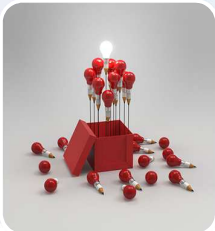
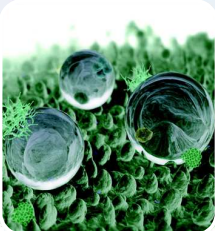
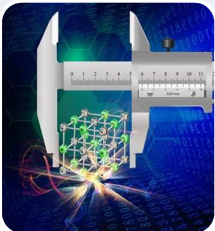

Founders

- VDP – German Pulp and Paper Association
- HPV – German Employers' Association of the Paper, Board and Plastics Converting Industry
- FPT – Paper Technology Research Association

Facts

- Founded in 1951
- 130 employees
- Munich and Heidenau/Dresden
- Independent and neutral

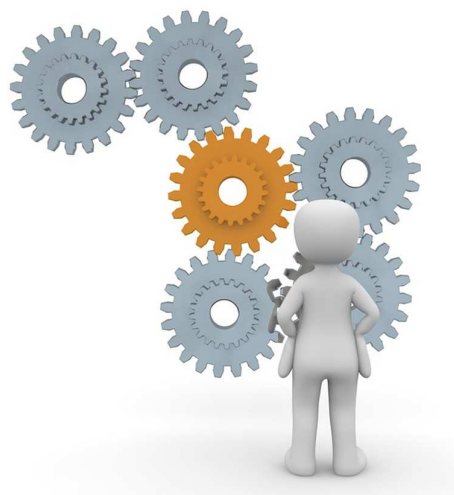
Papiertechnische Stiftung Competences

| Fibres & Composites | Packaging & Conformity | Print & Functional Surfaces | Innovative Measuring | Materials Testing & Analytics |
|--|--|--|--|---|
|  |  |  |  |  |
| <p>Efficient paper production</p> <p>Development of semi-finished products and bio composites</p> <p>Quality assurance in the use of paper for recycling</p> | <p>Coated barriers</p> <p>Packaging with novel functions</p> <p>Contactless manufacturing techniques</p> | <p>Functionalisation of web-shaped materials</p> <p>Optimisation of printability and runnability</p> <p>Surface evaluation</p> | <p>Measurement technology for process control in laboratories and industry</p> <p>Innovative sensor applications for online monitoring</p> <p>Integrating measurement technology in corporate data systems</p> | <p>Testing services for paper, paperboard and board</p> <p>Avoiding complaints</p> <p>Assessing the product performance</p> |

16.10.2017



SIGNIFICANCE OF SECONDARY FIBRES FOR PAPER AND BOARD PRODUCTION IN EUROPE



16.10.2017

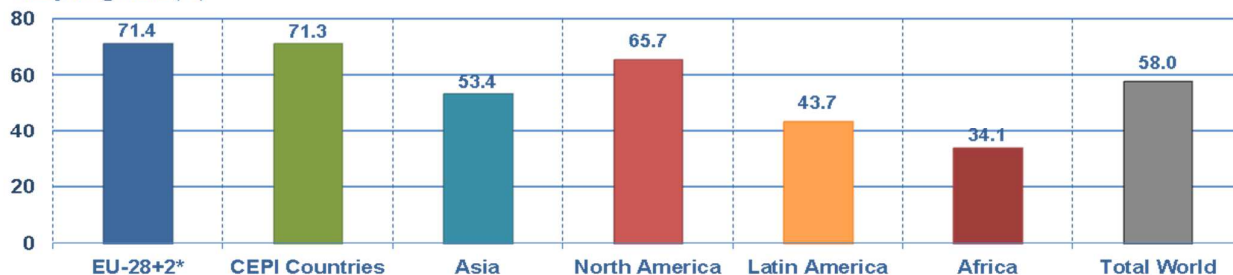
Picture credits: <http://www.gruesser.at/wlداustria/wp-content/uploads/megatrend-frauen.gif>



Significance of secondary fibres for paper and board production in Europe

| | World | Europe | Italy |
|---|-------------|-------------|-------------|
| ➤ Production of paper and board: | 408 mill. t | 106 mill. t | 8.8 mill. t |
| ➤ Utilization of <i>paper and board for recycling</i> : | 240 mill. t | 57 mill. t | 4.9 mill. t |
| ➤ Recycling rate: | 58 % | 67 % | 64 % |

Recycling Rate (%)



source: CEPI Annual Statistics 2015

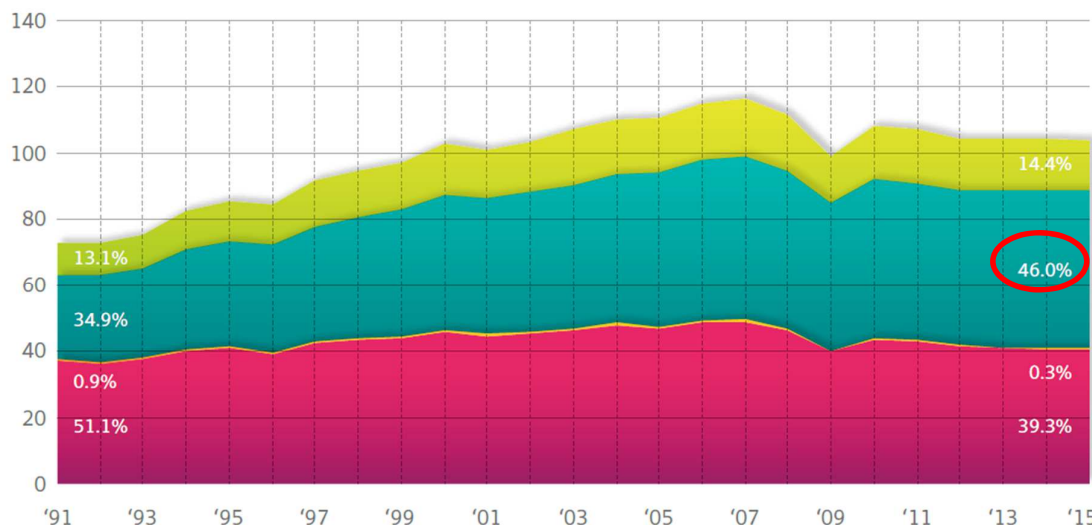
16.10.2017



Significance of secondary fibres for paper and board production in Europe

With a share of 46 % *paper for recycling* is the most important raw material for the paper and board industry in Europe.

Million Tonnes



CEPI Key statistics 2015

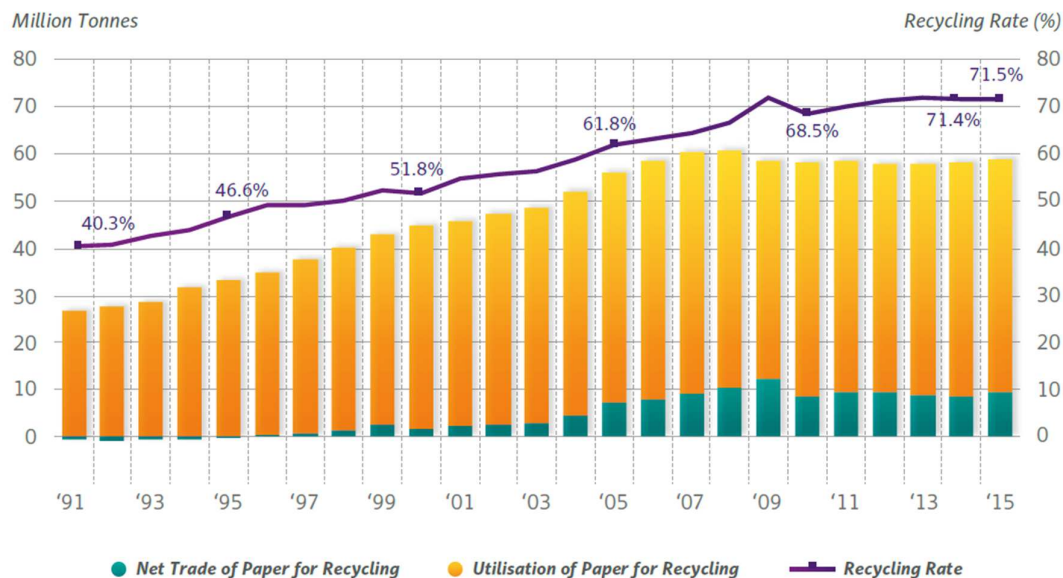
● Woodpulp ● Pulp Other than Wood ● Paper for Recycling ● Non-Fibrous Materials

16.10.2017



Significance of secondary fibres for paper and board production in Europe

The recycling rate of *paper for recycling* in Europe is increasing, to 71.5 % in 2015.



¹ Recycling Rate = "Utilisation of Paper for Recycling + Net Trade of Paper for Recycling", compared to Paper & Board Consumption
² Europe means EU-28 countries plus Norway and Switzerland

source: CEPI Key Statistics 2015

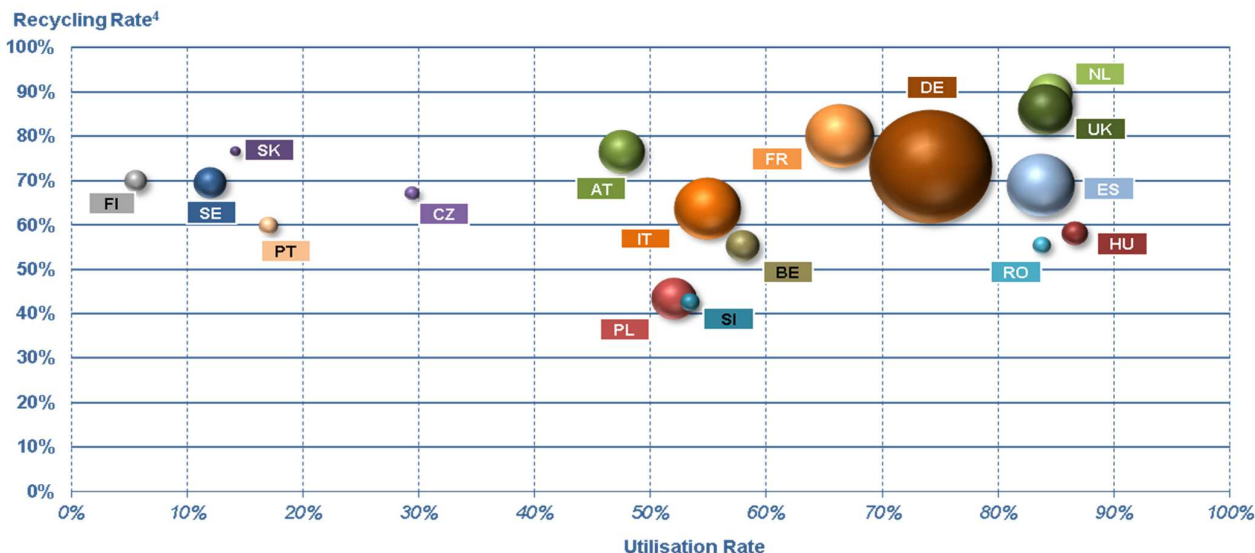
16.10.2017



Significance of secondary fibres for paper and board production in Europe

Regional differences in utilisation and recycling of *paper and board for recycling*.

Recycling Rate, Utilisation Rate and Utilisation of PFR in 2015



Bubble size is proportional to the Utilisation of Paper for Recycling

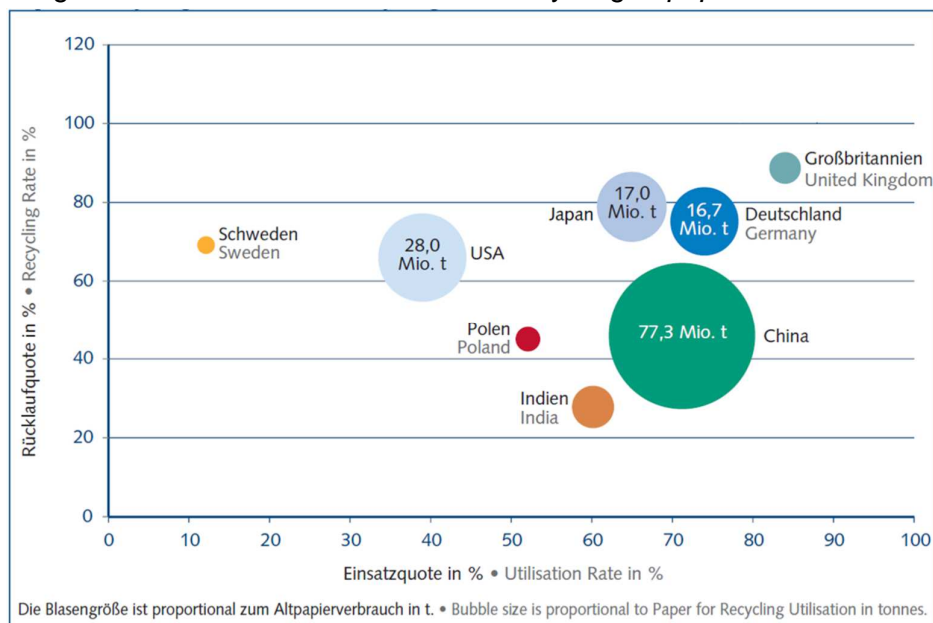
source: CEPI Annual Statistics 2015

16.10.2017



Significance of secondary fibres for paper and board production in the world

Regional differences in utilisation and recycling of *paper and board for recycling*.



16.10.2017

source: VDP Leistungsbericht



QUALITY OF SECONDARY FIBRES



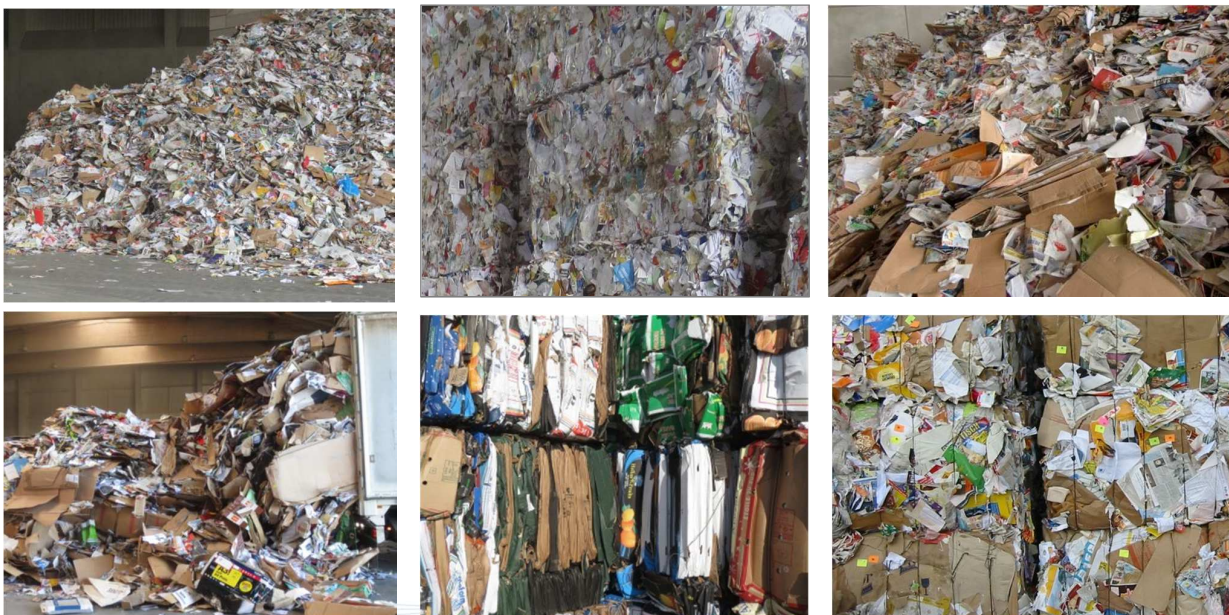
16.10.2017

Picture credits: <http://www.gruesser.at/wlidaustria/wp-content/uploads/megatrend-frauen.gif>



Quality of secondary fibres as a challenge

Being a secondary raw material *paper for recycling* is characterized by a strong inhomogeneity and greatly varying compositions.






16.10.2017

Supply chain of paper and board for recycling



16.10.2017

Different view on quality of secondary fibres

| Paper products | Grades (EN 643) | Pulp |
|---|---|---|
|  |  |  |
| <p>Fibre pulp</p> <p>Non paper parts of paper products</p> <p>Contamination</p> | <p>Source</p> <p>Composition</p> <p>Non paper components</p> <p>Unwanted components</p> | <p>Fibre quality</p> <p>Ash content</p> <p>Contamination</p> |

16.10.2017



 PTS
 FIBRE based solutions

CHALLENGES TODAY AND TOMORROW

- Which future trends will have an impact on 'paper and board for recycling'?



16.10.2017

 Picture credits: <http://www.gruesser.at/wlداustria/wp-content/uploads/megatrend-frauen.gif>


 PTS
 FIBRE based solutions

Challenges today and tomorrow

Trends with an impact on 'paper and board for recycling'

Megatrend e-commerce:

- Digital networking is turning the internet into a global market place
- For more and more people, online shopping is becoming the most convenient way to do one's shopping



Expenses for **online advertising** are rising
 ↓ advertising pressure

Online shopping is superseding classical catalogue orders
 ↓ catalogues

Delivery of merchandise by post
 ↑ shipping packaging

16.10.2017

Picture credits: <http://www.fabeau.de/wp-content/uploads/2012/08/Zalando-Paket.png>



Challenges today and tomorrow

Trends with an impact on 'paper and board for recycling'

Megatrend digitalisation:

- A conversion to electronically assisted processes by means of information and communication technology



Digitalisation of information
 ↓ print products

Digitalisation of communication
 ↓ printing paper

Digitalisation of bookkeeping
 ↓ printing paper

16.10.2017

Picture credits: <http://www.book-keepers.de/wp-content/uploads/2015/07/Finanzbuchhaltung.jpg>



Challenges today and tomorrow

Availability of 'paper for and board recycling'



➤ Changes in *paper for recycling* composition

Digitalization and e-commerce are causing a reduction in the consumption of print products. This affects directly the composition and thus also quality of *paper for recycling*.



➤ Availability of *paper for recycling*

Due to new production capacities for packaging paper the demand for *paper for recycling* is increasing. At the same time, the availability of high-quality *paper for recycling* grades is decreasing due to the reduced use of primary fibres and the decreasing production of graphic papers.



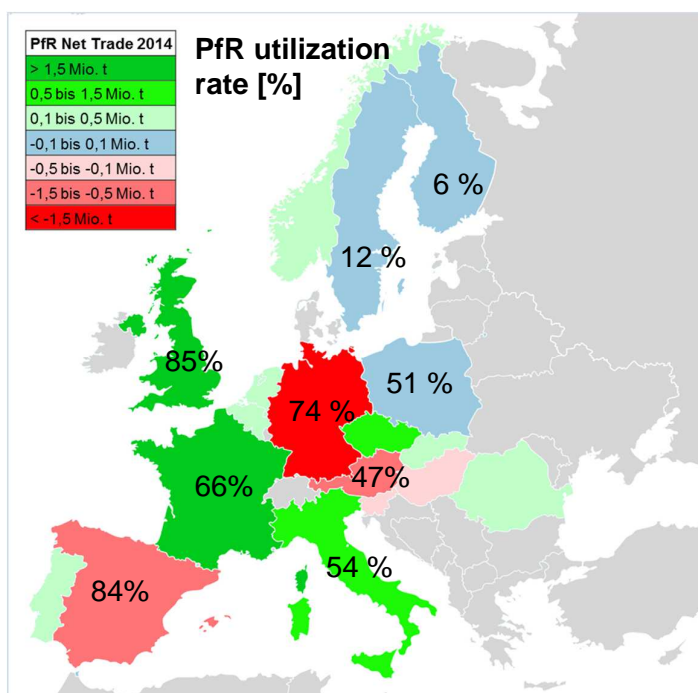
➤ Supply reliability of *paper for recycling*

In a global market for secondary fibres, fluctuations in supply and demand are becoming increasingly complex. Reliable partnerships along the supply chain will gain in importance.

16.10.2017

Challenges today and tomorrow

Availability of 'paper for and board recycling'



Paper for recycling utilization and paper and board production

| country | PfR use | production |
|---------|-------------|-------------|
| DE | 16,6 Mio. t | 22,5 Mio. t |
| SE | 1,2 Mio. t | 10,4 Mio. t |
| FI | 0,6 Mio. t | 10,4 Mio. t |
| IT | 4,7 Mio. t | 8,6 Mio. t |
| FR | 5,4 Mio. t | 8,1 Mio. t |
| ES | 5,1 Mio. t | 6,0 Mio. t |
| AT | 2,3 Mio. t | 4,9 Mio. t |
| UK | 3,7 Mio. t | 4,4 Mio. t |
| PL | 2,1 Mio. t | 4,2 Mio. t |
| CEPI | 47,5 Mio. t | 91,1 Mio. t |

source: VDP Leistungsberichte

16.10.2017

Challenges today and tomorrow Trends with an impact on 'paper and board for recycling'

Megatrend globalization:

- Increasing internationalisation and global interrelations between markets and companies



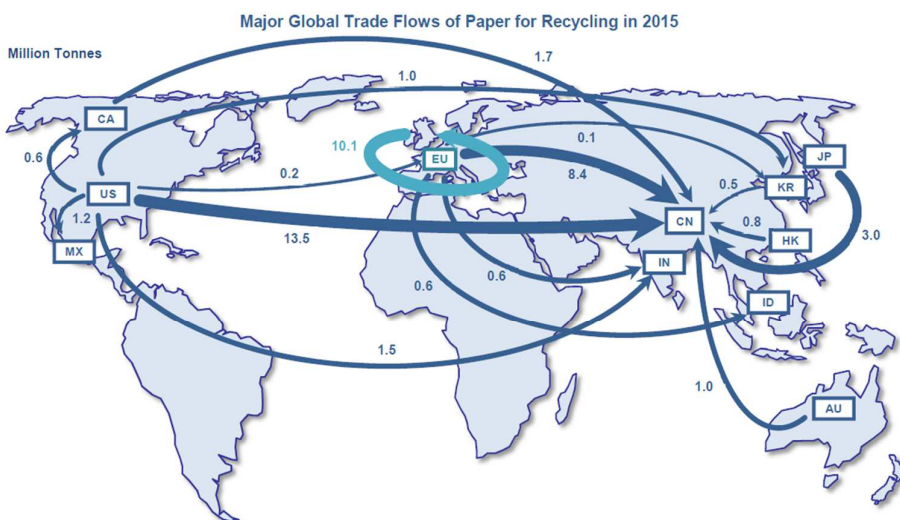
Global trade of raw materials (such as paper for recycling)

- ⊗ local fluctuations in supply and demand are affecting the availability and prizes of raw materials worldwide

16.10.2017



Challenges today and tomorrow Global trade of 'paper and board for recycling'



Challenges today and tomorrow

Trends with an impact on 'paper and board for recycling'

Megatrend individualisation:

- People have always striven for autonomy and self-determination
- An individualistic society is evolving into a society of inimitability



Individualisation of products

↑ complexity of products



Production in small or medium quantities (batch size 1)

↑ diversity, digital printing



Small household sizes

↑ specific packaging volume

16.10.2017

Picture credits: <http://blog.planungswelten.de/wp-content/uploads/mymuesli-schale2.jpg>; https://www.dekra-safety-web.eu/fileadmin/user_upload/individualisierung.jpg

Challenges today and tomorrow

Quality of 'paper and board for recycling'



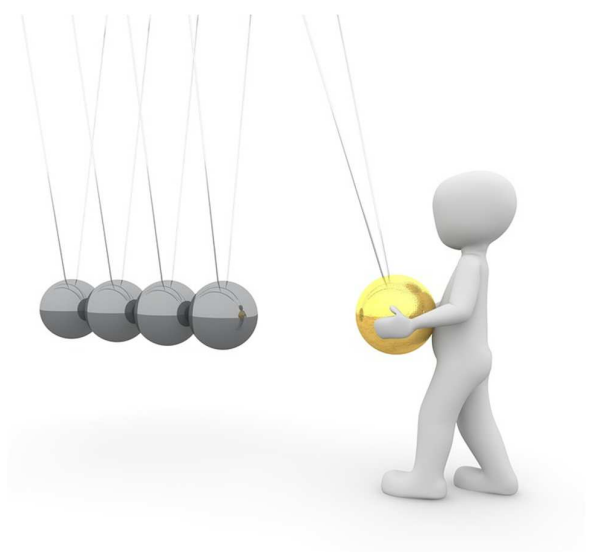
Individualisation causes greater complexity of the products with a variety of raw materials and additives being used. The share of composite packaging is increasing.

Challenges for:

- **Entry Inspection of *paper for recycling***
 - control measures
 - quality parameters
- **Recycleability**
 - Pulping
 - Deinking
 - Sticky removal etc.
- **Recycling loop impurities**
 - minerals (fillers and pigments) affecting the fibre yield
 - non paper components affecting reject rates
 - environmental and health-relevant substances

16.10.2017

SOLUTIONS?



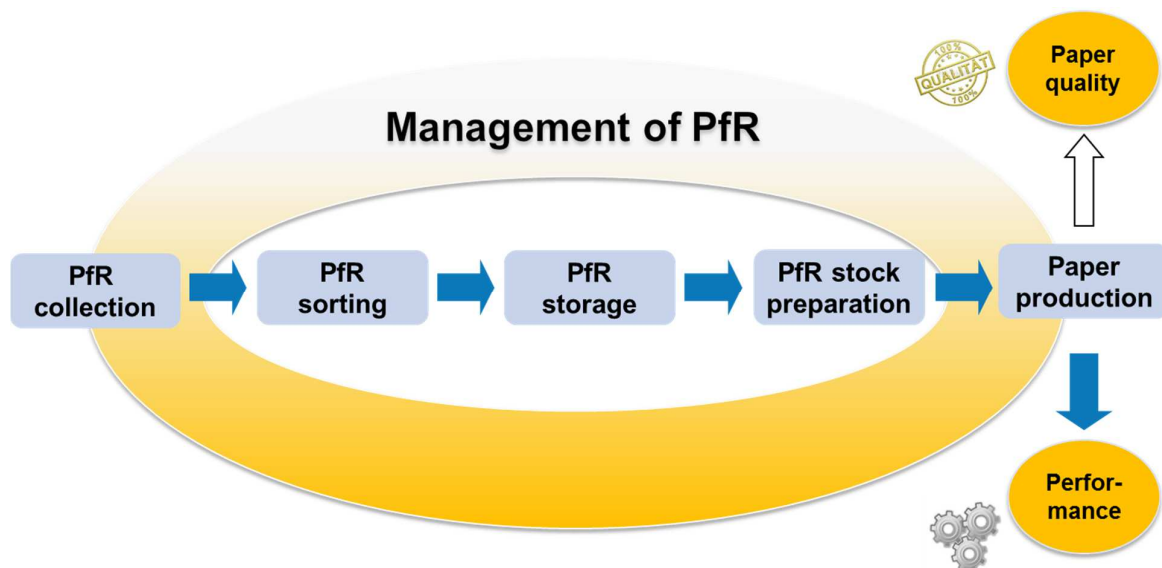
16.10.2017

Picture credits: <http://www.gruesser.at/wlداustria/wp-content/uploads/megatrend-frauen.gif>



Improving the management of *paper and board for recycling*

A consistent quality management of *paper for recycling* is essential and will become even more important in the future.



16.10.2017



Improving the management of *paper and board for recycling*

Collection of paper and board

EU Project: **IMPACTPaperRec**

“Boosting the implementation of participatory strategies on separate paper collection for efficient recycling”

- Promoting **separate collection of paper and board**:
 - Implementing already known good and best practices
 - Identifying innovation needs



- Best Practice Handbook: <http://impactpaperrec.eu/en/best-practices/>

➤ Partner:



16.10.2017



Improving the management of *paper and board for recycling*

Smart Value Chain

Sensor-based sorting technologies: measured data could be systematically analysed to provide quality data directly with each consignment of paper and board for recycling



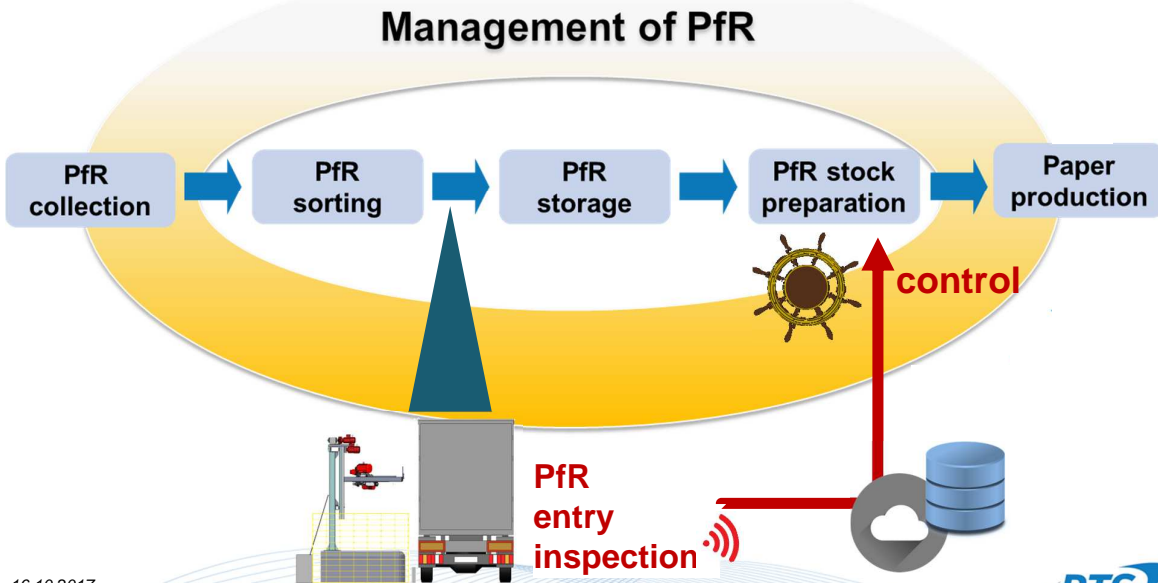
16.10.2017

Quelle: Hempel, Tempel, 'Industry 4.0 – opportunities to optimize the use of paper and board for recycling'. bvse Altpapiertag 2017



Improving the management of *paper and board for recycling* integration within the paper mill

Integration of the entry inspection of *paper and board for recycling* into the production process



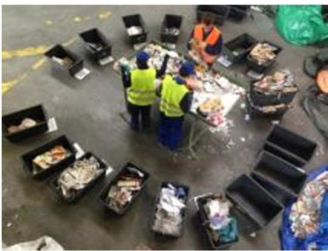
16.10.2017



Measuring technology for quality control Overview

Loose PfR

Manual



PfR in Bales



HPNA

Monitor

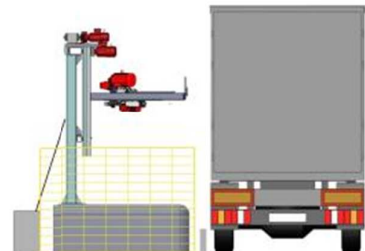


PBS



AP 500

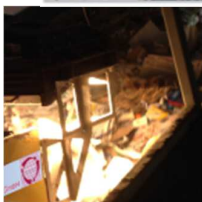
Balemat 2 Truck



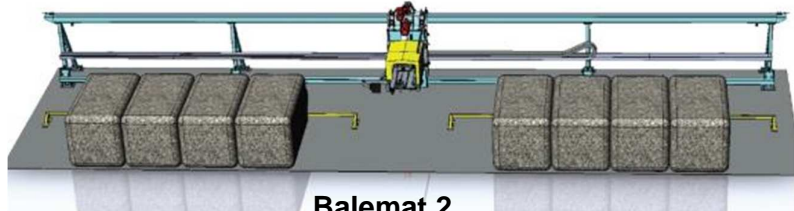
AP Monitor



Balemat



MAX POS



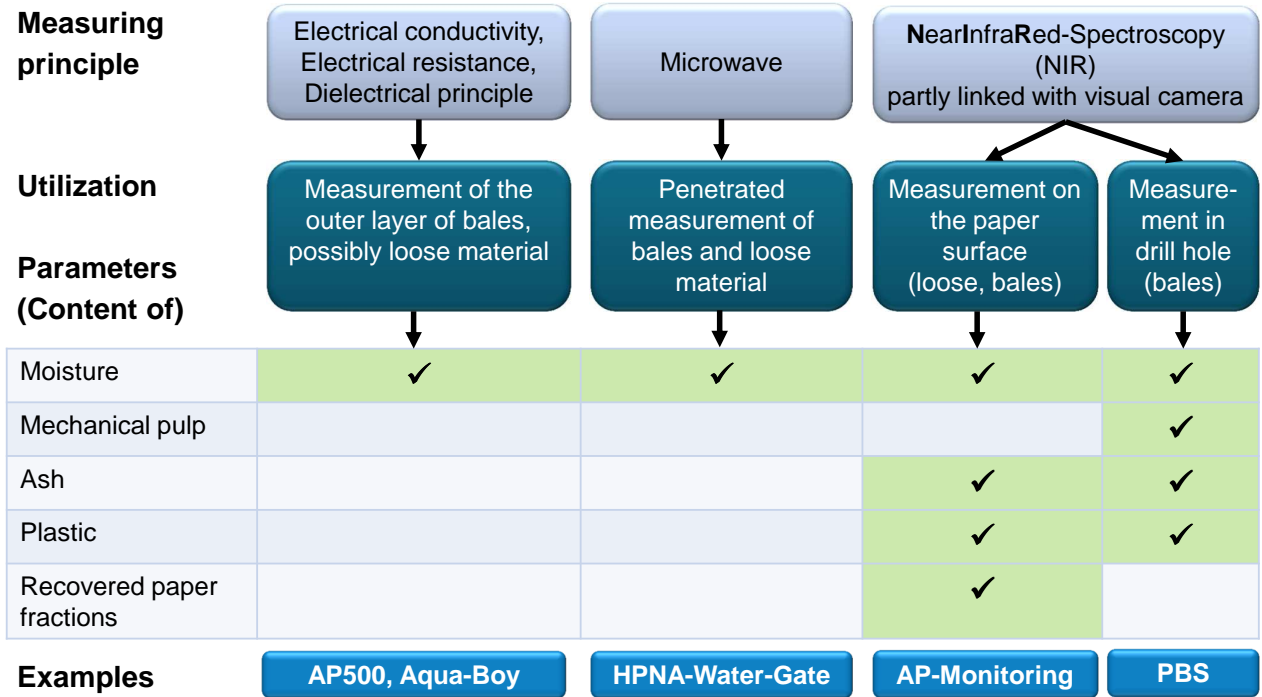
Balemat 2

16.10.2017



Measuring technology for quality control

Overview measuring principle, parameters, utilization



16.10.2017



Thank you for your attention

Lydia Tempel

+49 (0) 3529 551-721

lydia.tempel@ptspaper.de



PTS Heidenau

Pirnaer Str. 37

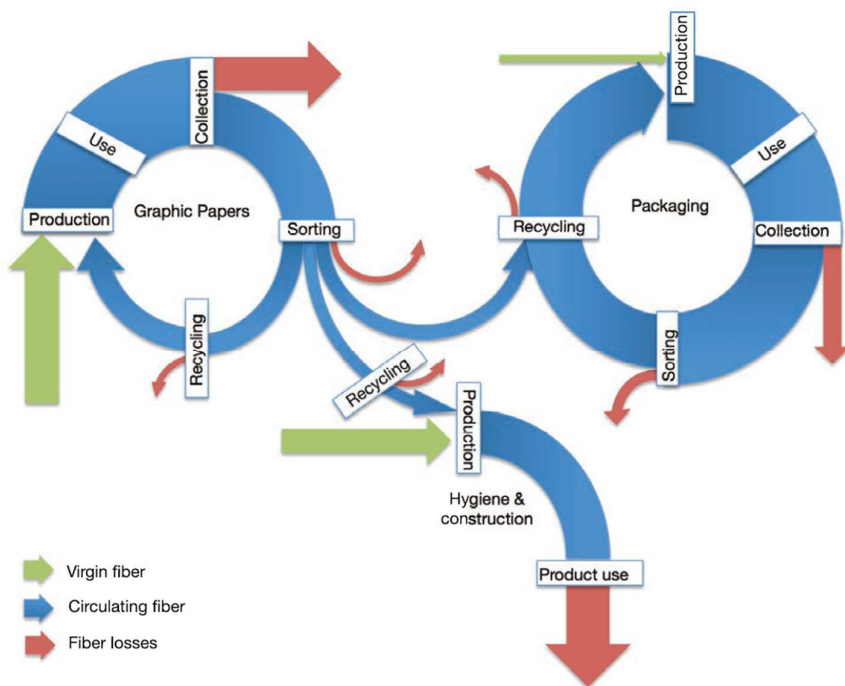
01809 Heidenau

<http://www.ptspaper.de>

16.10.2017



Fibre cascades



- Virgin fibres are used mainly in the area of graphic paper production.
- Virgin fibre input into recycling loop depends on production of magazine paper and wood-free paper.
- Use of mixed grades (PfR) introduces graphic paper into the packaging paper loop, bringing along fresh fibres, but also minerals (ash).

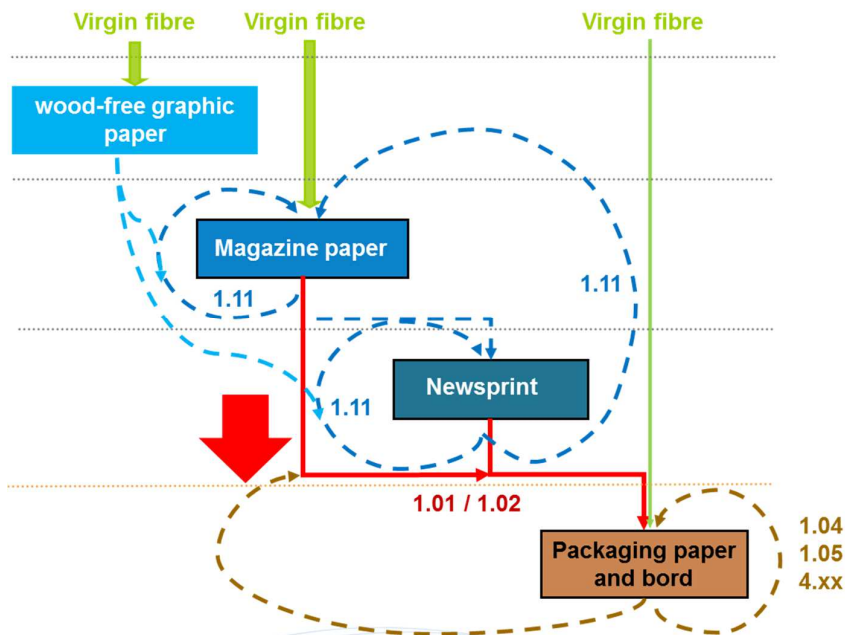
16.10.2017

Source: Design and Management for Circularity – the Case of Paper. White Paper. World Economic Forum, 2016



Fibre cascades

A drop in production/consumption of magazine paper and/or wood-free graphic paper causes a volumetric decline in paper grades for recycling 1.01.00, 1.02.00, 1.11.00.



Source: Entwicklung Altpapierqualität – Ursachen und Folgen, C. Seidemann, L. Tempel, Wochenblatt für Papierfabrikation 8/2015

16.10.2017



Improving the management of *paper and board for recycling* Sortierung von Altpapier

Operating a sorting plant for paper and board according to the input material quality



16.10.2017

ENTSORGUNGSTECHNIK BAVARIA GmbH



PTS
FIBRE based solutions