

Environmental Impact and Sustainability Aspects of Digital Printing at CEWE

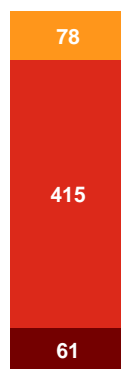
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CEWE Business Units and Brands

Turnover
in Mio. Euro

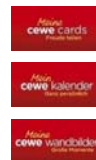


Commercial
Online-Printing

Brands



Photofinishing



Retail



CEWE Corporate Structure 2016

- 12 Operational Sites
- 24 European Countries
- 3.400 Employees
- More than 25.000 b2b customers
- > 6.0 Mio CEWE PHOTOBOOKS
- > 2.2 Bln. Prints (Photos) produced
- 554.2 Mio. Euro Turnover in 2015



► CEWE is Europe's leading Photofinisher and innovative Online Printpartner



CEWE Reporting on Sustainability since 2009

NACHHALTIGE BERICHTERSTATTUNG VON CEWE

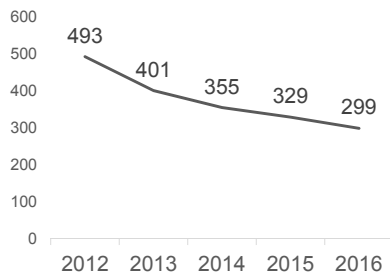
- Wir bilanzieren im Jahresrhythmus.
- Der Bericht 2015 wurde in Übereinstimmung mit der neuen GRI-G4-Leitlinie erarbeitet.
- Wir definieren Timings und Ziele.



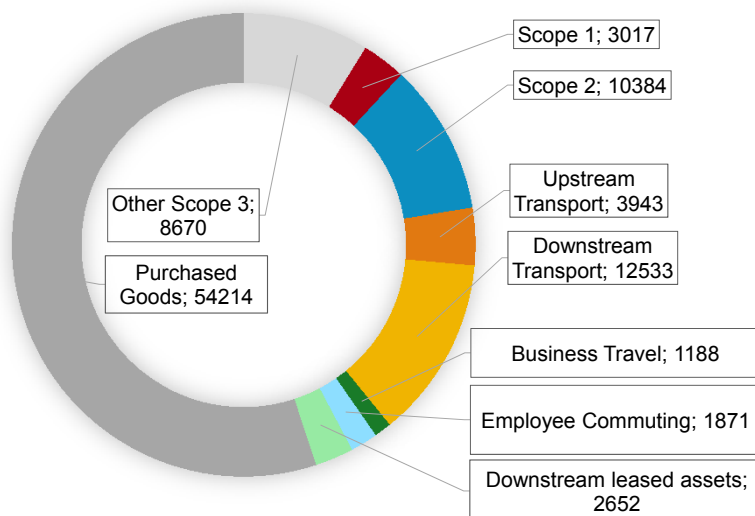
Carbon Disclosure Project I



Scope 1 and 2 CO₂ Emissions in kg per Ton Material



CEWE Carbon Footprint 2015 [t CO₂e]: 98.472 t



Saving Energy. Energy Generation and Efficiency Projects

PhotoVoltaic (2014) 260.000 kWh
(60 households)
Avoided Emission 105 t CO₂ / a.



Architekt Angelis & Partner, Oldenburg

2017: 3.000 m² office space climate neutral A/C.
Avoided Emission 150 t CO₂ / a.

Green IT (2013): one of 4 IT centers in D
certified by „Blauer Engel“.
Avoided Emission 150 t CO₂ / a.



Saving Energy. Efficiency Projects

LED-Lighting-Installation

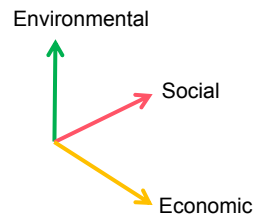
Installed 2015: Production Site Dresden (Saxoprint, 17.000 m²)
completely equipped with LED Lighting.
Avoided Emission 250 t CO₂ / a.



Digital Printing: Product Sustainability Aspects

Total Cost of Ownership	Compliance with Legislation	Energy Consumption	Water Consumption
Product Quality	Product Safety	Carbon Footprint	Waste water Characteristics
Customer Satisfaction	Packaging	VOC Emissions	Waste at Production Sites
Materials	OHS Occupational Health and Safety	Ozone Emissions	Waste at Product's End of Life
Supply Chain Logistics	Workplace Conditions	Other Immissions (e.g. Noise, Particulate Matter)	Distribution Logistics

Sustainability
= **Responsibility + Transparency**



M. Hausmann, Sustainability of the CEWE PHOTOBOOK, IS&Ts NIP 27, pg. 736 (2011)

Digital Printing: Current Trends of Sustainability / I

Reduction

Carbon Footprint



Recycling / Deinkability

INGEDE Press Release 3/2010

**"Accidental Drinking Trial":
Liquid Toner Prints Cause Significant Damage
in German Paper MBF**

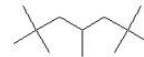


Digital Printing: Current Trends of Sustainability / II

Comparison

1. Indigo vs. AgX

ORWO leading the conversion from silver halide to HP Indigo Digital solution



Furthermore, by scaling back its silver halide photo production, ORWO can reduce the environmental impact of the waste water and electrolysis procedure for recovering silver. "By comparison, photo production using the HP Indigo Digital Presses is incredibly clean," says Ullbricht.

Digital Printing: Current Trends of Sustainability / III

Comparison

2. Xeikon at ecoprint 2012

3. E-ROI model by hp

Sustainability through Variable Data Printing

Steven Simske, Hewlett-Packard Labs, 3804 E. Harmony Rd., MS 26, Fort Collins CO 80526, USA
 Jason Anzoff, Hewlett-Packard Labs, 3804 E. Harmony Rd., MS 26, Fort Collins CO 80526, USA
 Margaret Sturgill, Hewlett-Packard Labs, 3804 E. Harmony Rd., MS 26, Fort Collins CO 80526, USA
 Mark Vora, Hewlett-Packard Labs, 3804 E. Harmony Rd., MS 26, Fort Collins CO 80526, USA

E-ROI for paper and electronics

$$E-ROI(\text{paper}) = 1.0 \cdot 1.0 \cdot 0.56 \cdot 5C / 1.0 \cdot 1.0 = 0.56 5C$$

$$E-ROI(\text{electronics}) = 1.25 \cdot 1.0 \cdot 0.21 \cdot 5C / 0.8 \cdot 1.0 = 0.33 5C$$

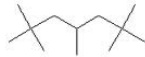
From this, we can see that the model predicts a better E-ROI

S. Simske et al., Sustainability through Variable data Printing, IS&Ts NIP 28, pg. 533 (2012)

Digital Printing Sustainability / I: Liquid Electrophotography

Carrier Liquid (Imaging Oil) is a VOC (volatile organic carbon)

Possibly Isopar L H304: May be fatal if swallowed and enters airways



cewe VOC emission rate	200 mg/m ²
cewe VOC paper-residue	20 mg/m ²
cewe Oil disposal	3000 mg/m ²

2015 hp-cewe project: Oil recycling / re-use

M. Hausmann, Sustainability of Printing Techniques: Potentials and Incomparable Aspects, IS&Ts NIP 29, pg. 410 (2013)

Digital Printing Sustainability / II: Liquid Electrophotography

Cleaning Liquids Ethanol instead of Isopropanol

(2013 hp-cewe project)

both high flammability (H225)
IPA also eye irritant (H319)
and may cause drowsiness /
dizziness (H336)



Ethanol usage

10 mg/m²

Ozone concentration

10 ppb (limit 100 ppb)

Carbon footprint

0.1 kWh/m² = 40 g CO₂e/m²

Paper recycling

Deinking is dubious –

Material choice also matters
(e.g. E-paper: Schöller / Kodak / Mitsubishi)

Digital Printing Sustainability / III: Dry Electrophotography

Dry Toner with Low Melting Point (photobooks in glove compartment, trunk)



Overcoating / laminating compromises deinkability



Polyester with tin-organic compounds

BPA discussion (Bisphenol A)

Particulates / fine dust, caused by fuser oil

Nanomaterial

Quality with bigger toner size?

Ozone concentration 10 ppb (limit 100 ppb)

Carbon footprint 0.1 kWh/m² = 40 g CO₂e/m²

Paper recycling Deinking perfect –

only without additional treatment (coating / laminating)

Digital Printing Sustainability / IV: Inkjet, water based

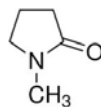
CEWE: Large Format only

Photopaper PE laminated (→ no deinking / no recycling)

Quality: photo perfect

Solvent supplements / additives

(1- Methyl-2-pyrrolidone = SVHC)



Carbon footprint 0.03 kWh/m² = 12 g CO₂e/m²

because no drying required (slow process)

Paper recycling No. Waste incineration

Digital Printing Sustainability / V: UV-Inkjet / UV-Coating

UV Inkjet / UV Coating	products are not foodsafe: migration smell / unpleasant odor
Photo-Initiators	benzophenones: reaction products cause smell Di-aryl-benzoyl-phosphinoxides (LED) are reprotoxic cat. 2
Most acrylates are	skin irritant (H 315), eye irritant (H319), and many are also sensitizing (H317)
Ozone formation	with Hg-UV-lamp; better with LED
Ozone concentration	20 ppb (Inkjet), 40 ppb coating (limit 100 ppb)
Carbon footprint	0.5 kWh/m ² = 200 g CO ₂ e/m ²
Paper recycling	No. Waste incineration

chemicals undergo a photoinitiated radical reaction with

- unsure outcome and
- < 100% completion



Digital Printing Sustainability / VI: Waste Considerations

CEWE overall waste ratio 33 %

Recyclability in EU
= De-Inkability

De-Inkability problems
are "bad news" for us!

INGEDE Press Release 3/2010

**"Accidental Drinking Trial":
Laser Toner Prints Cause Significant Damage
in German Paper Mill**



Conclusion – Design for Sustainability

Transparent: open communication
Responsible: address also all concerns



All-embracing: consider **use** and end-of-life (**waste** phase)
Far sighted: respect current and anticipate future legislation

Balancing: optimizing for products which are

