Improving Resource Efficiency in Small and Medium-sized Enterprises (SME)

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Overview

1. Facts about North-Rhine Westphalia
2. Short introduction of Effizienz-Agentur NRW
3. Efficiency – the way to more success?
4. EFA Toolbox: e.g. ®PIUS-Check
5. Examples from industry - Video
6. Conclusion
Facts about North-Rhine Westphalia

150 million consumers within about a 500-kilometer radius

NRW 2009

Area 34,088 km²
Population 17.9 million
Population density 526/km²
GDP 521.7 bn €
Rank 17 in the world*
GDP per capita 29,160 €
Gainfully employed 8.7 m
Private consumption** 323.8 bn €
Exports 138.6 bn €
Imports 147.8 bn €
Foreign direct investments*** 187.7 bn €

* Worldbank 2010; **data: as of end of 2008
Operating Industries of SMEs in NRW

Small and medium-sized enterprises: 600,000

in industrial production: 12,000
(20 up to 500 employees)

Industrial sectors

- Metal processing: 44%
- Electronic: 8%
- Food processing: 5%
- Textile: 6%
- Paper and Printing: 9%
- Chemical: 25%
- Wood / Furniture: 3%

Objective:
- Improve Competitiveness of Small and Medium sized Enterprises (SMEs) by supporting a strategy of sustainable growth

Approach:
- Introduce Innovative Technologies, Methods and (Business-) Processes to SMEs that improve resource efficiency, avoid waste & hazardous emissions and deliver instant results

Note:
- The economic benefits should be the driving factor behind the implementation of measures and not environmental legislation
The setup of Effizienz-Agentur NRW as a Public Private Partnership (PPP)

Ministry for Environment and Nature Conservation, Agriculture and Consumer Protection in the State of North Rhine Westphalia

Contract

prisma consult GmbH

provides legal body

Effizienz-Agentur NRW

Developes methods and performs projects with SME

Confirms
Working with SME

**Basic Approach:**

- Resource consumption as a cost factor and
- Reduction of resource consumption as a competitive advantage

**Offer:**

- Competent and independent support with the first steps towards resource efficiency
Why more material efficiency?

Cost structure in processing businesses in Germany

- **Materials**: 45%
- **Merchandise**: 11%
- **Miscellaneous**: 17%
- **Rent, depreciation, capital and tax costs**: 17%
- **Energy**: 8%
- **Personnel**: 2%

Source: DeStatis, Berlin 2010
Resource Efficiency: Cleaner Production vs. End-of-Pipe

- increases the Resource Efficiency in the production
- reduces the input of resources, the need for end-of-pipe-technology and the mass of waste
The German strategy for more resource productivity

objective of the German federal government till 2020:
doubling of resource productivity (relating to 1994)

1. Increase number of consulting projects
2. implemented projects stimulate demand for CP
3. demand stimulates multiplicity of supply of CP technology
Example for cleaner production: Recovery of Zinc Chloride in Fibre production

Vulkanfiber Fabrik Ernst Krüger GmbH & Co KG

- 50 employees
- supplier of the automotive, electronics and textile industries produce
- products made of vulcanised fibre
What is Vulcanised Fibre?

Vulcanised Fibre is a multipurpose material, fabricated from a special paper based on cotton and cellulose. Relying on renewable raw material, vulcanised fibre provides the following advantages:

- high strength combined with low weight
- good antistatic properties
- good electrical properties (spark resistant)
Manufacture of vulcanised fibre

- paper web is dipped in a concentrated zinc chloride solution
- surface of the single fibre is etched
- on the surface, so called hydrate cellulose is formed
- the paper mass is compressed and as a result of this, the individual fibres are compounded
- the paper web passes through the rinsing chamber, to rinse away the surplus zinc chloride
- after this it is cured in a dryer
Why clean technology?

The fluid in the rinsing chamber containing the surplus of Zinc Chloride had to be treated as waste water.

For over 10 years Vulkanfiber Krüger had been on the look-out for a solution:

• more cost-effective

• saving the valuable raw material and the water
A new, clean technology as a solution

Reversed osmosis creates a closed loop process

flow of fibre

parchment process

zinc chloride solution

reverse osmosis

rinsing chamber

Pre-filtration

recycled water

dryer
The reversed osmosis
The figures of six years operating experience

- recovery of process-fluid: 25 m³/day
- 100 % recovery of the surplus of Zinc Chloride
- costs for the softening of process water are reduced
- smooth and low-maintenance operation
- ROI (Return on Invest) < 3 years
- contrary to initial expectations, the service life of the membrane employed turned out to be twice as – with a positive impact on current operating costs
Criteria for successful programmes

1. Communication of opportunities and motivation is essential
2. Traceable quantification of potentials in the business itself - rather than macroeconimical figures
3. Support for finding the “right” solution (technology, organisational)
4. Funding Programmes: Transparency, Accessibility, Simplicity
5. Evaluation - to make the success of resource efficiency visible in the Business
   Programmes should be focussed - one Priority!!
EFA-Toolbox: The first step to more resource efficiency

- Implementing Cleaner Production Solutions
- Transparency regarding costs and business processes
- Creating “Greener Products” faster
- PIUS-Financing & Funding
®PIUS - Check: a Cooperation project

between

• an industrial producer
• a technical consulting company
• and the Effizienz - Agentur NRW

with the objective of performing a material flow analysis at the industrial company.

PIUS is a registered trademark of the Effizienz-Agentur NRW
Demand for the Projects

The Company
- Strategy (history, today, next 5-10 years)

The Cause
- Process, Technique, laws, security of employees

The Readiness for Changing

The Culture of the Company
- Staff development, Identification, Morale
- Communication
The Tasks of the Partner

Company
- availability - internal resources, data
- one Projectmanager (client)

Effizienz-Agentur NRW
- consulting, implementation of EID
- coach to the change-process (client)

Consulting Company
- material flow analysis,
- developing of manufacturing plans (customer)
Five steps to improve resource efficiency significantly

- **Initial Meeting**
  - Check relevance of Cleaner Production (e.g. technologies)

- **Macro-Analysis**
  - Material flow analysis within company

- **Intermediate Meeting**
  - Definition of further action

- **Micro-Analysis**
  - Develop alternative manufacturing concepts

- **Implementation of the results**

- • after 6 - 9 months: EFA checks whether goals have been achieved
1. Step: Initial Meeting

- Structure of the Company, Employees, industrial sector
- Strategy for the next 5-10 years
- Most relevant processes
- Current data
- Management systems

- Fix a consulting demand
- Discuss and fix Objectives and expectation
2. Step Macro Analysis

- Searching and analysing current data
- Visualization of the processes
- Work out the most relevant Material- and Energy Consumptions

Processes with most potential of improvement
Adjustment to the interest of the Company
Macro - Analysis

**Production 2003**
Overall: 180,000 units

- **Natural gas**: 3.500 MWh/a
- **solvent**: 37 t/a
- **Electricity**: 400.000 kWh/a
- **Oil**: 310 MWh/a

- Opening and the remaining content of the barrels are carried out
- Burning out
- Radiation procedure, the barrels are levelled
- The barrels are varnished
- Barrels are stored (1 or 2 days)
- Barrels are supplied with new seals and lids
- Barrels to the customer

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3. Step: Micro Analysis

- specify data on 1-2 aspects
- propose alternatives
- test Technical Practicability
- implementation of EID with a concrete benefit

Priority list for the Company
4. Step: Concept Planing

- Discussing the results with the management
- action planing (next steps,...)
- planning of the invests

Realization
Status quo ®PIUS-Check

- Metal processing: 21%
- Non ferrous metal: 7%
- Food processing: 19%
- Textile: 5%
- Timber / furniture: 1%
- Paper / printing: 7%
- Chemical: 6%
- Ceramics: 3%
- Surface finishing: 13%
- Machine construction: 6%
- Car service: 4%
- Laundry / dry-cleaning Service: 3%
- Plastic processing: 4%
- Leather: 0%

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January 2011
## Current results

<table>
<thead>
<tr>
<th>PIUS-Checks</th>
<th>527</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implemented projects</td>
<td>44%</td>
</tr>
<tr>
<td>Investment amounts to</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>€ 39.5 m</td>
</tr>
<tr>
<td>Per SME*</td>
<td>€ 96,000</td>
</tr>
<tr>
<td>Annual savings in the production processes</td>
<td>€ 11.7 m</td>
</tr>
<tr>
<td>Annual savings of the resource water/waste water</td>
<td>1,194 m³</td>
</tr>
<tr>
<td>Annual savings of the resource energy</td>
<td>60.1 GWh</td>
</tr>
<tr>
<td>Annual savings of CO₂</td>
<td>10,800 t</td>
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</tbody>
</table>

** * Average value excluding the 10 biggest investments & savings

** only reduction of Energy and water costs

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PIUS-Check Example No. 1: Brewery (1)

Employees: 33

Products: various beer types

Focus: water conditioning,
steam and energy supply,
cleaning and transport procedure

Benefits: less product is lost due to a change of the beer type,
the water needed for cleaning a keg is reduced by two thirds

Savings: 1,100 hl of beer (product), 9,200 m³ of water and 9% less electricity,
that means 90,000 Euro/year

Invest: 35,000 Euro

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PIUS-Check Example No. 1: Brewery (2)

Problem: Depletion of the pipeline located between storage and bottle-/kegfiller. The cleaning, formerly performed with water, is necessary, when the beer type is changed or the filling process is finished.

Solution: Now carbondioxide is used to clear the pipes. No mixture of beer and water arises, which could not be sold as a product.
PIUS-Check Example No. 2: Surface Technology (1)

Employees: 10

Products: Remove coating from aluminium and steel surfaces as well as …..

Focus: Process optimisation

Benefits: reduced usage of 40% chemicals

Savings: 36 tons of chemicals and 85,000 Euro/year

Invest: personal contribution, usage of second-hand equipment
Problem: A lack of control systems, formerly, the concentration of the chemicals was not measured, the whole process was very inefficient.

Solution: The temperature of the baths are now controlled, pressure air keeps the water in movement. The accommodation of temperature and concentration of chemicals works much better.
PIUS-Check Example No. 3: Forging Company (1)

**Industry**: Steel, forge and rolling mill

**Employees**: 470

**Products**: - open-die forgings from 10 kg up to 35,000 kg
- seamless rolled rings up to 3,500 mm OD
- forged bars up to 850 mm OD/square and up to 15 m in length
  
  *in alloyed and unalloyed steel grades.*

**Focus**: Reduction of allowance regarding Material Input
PIUS-Check Example No. 3: Forging Company (2)

Problem: Material Input in the production process was planned on the basis of the final dimensions of the product (height and width).

Solution: Self programmed software for planning accuracy regarding the Material Input. Now additional parameters are taken into account: Steel quality, tinder losses, offcuts, variances in the chipless forming processes.

Cost: ½ man-year internal work

Savings: 3% of the Material Input regarding the product range seamless rolled rings

1,000 t/a of Steel 1,000,000 EURO per year
PIUS-Check Example No. 4:

Industry: metal melting and rolling process

Employees: 80

Products: copper wire ,"dg Rhein-Rod"®, (diameter between 8 - 16 mm)

Focus: optimisation of melting process and copper wire production

Benefits: reduced usage of nitrogen gas and new material flow controlling

Savings: nitrogen: 500,000 m³/year and more than 50,000 Euro/Year

Invest: slight
®PIUS-Check Example No. 5:

Industry: electroplating Industry / surface finishing

Employees: 40

Products: plated metal parts with copper, nickel and chromium

Focus: optimisation of rinsing process

Benefits: reduced usage of water and chemicals, material flow controlling

Savings: water: 500 m³/a and 4,000 Euro/a

chemicals: 275 kg/a and 3,000 Euro/a

Invest: slight

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®PIUS-Check Example No. 6:

Industry: supplier for automotive industry
Employees: 400
Products: exhaust system components and pipe fittings
Focus: handling of machining coolants and compressed air metering

Benefits: vacuum distillation of coolant and conservation of energy
Savings: a) emulsion: 500 m³/year and 40,000 Euro/Year
  
  b) compressed air: 1,000,000 m³/year and 4,000 Euro/Year
Invest: a) 110,000 Euro, b) slight
PIUS-Check Example No. 7:

Industry: Laundry
Employees: 85
Products: Hotel- und Hospital-Textiles
Focus: Water-Recovery in Laundry

Benefits: Waste Water Reduction by 35%,
Energy Usage Reduction for Washing by 50%

Savings: Fresh & Waste Water Cost: 55.000 €/a
Energy Cost: 70.000 €/a

Investition: 150.000 €

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®PIUS-Check Example No. 8:

**Industry:** textile industry

**Employees:** 180

**Products:** printed textiles with coloured printpaste

**Focus:** implementation of an TRP System (Total Printpaste Return)

**Benefits:** 85% recycling of printpaste and reduction of water pollutant

**Savings:** 350 tons printpaste/year and 175,000 Euro/year

77 tons of COD/year (water pollutants) and 30,000 Euro/year

**Invest:** 550,000 Euro (funding 200,000 EURO)
®PIUS-Check Example No. 9:

Industry: textile industry
Employees: 190
Products: textile treatment and finishing
Focus: Implementation of a new washing machine with preliminary cleaning

Benefits: reduced usage of water and energy (natural gas)

Savings: water: 12,000 m³/year and 36,000 EURO/year
energy: 490 MWh/year and 17,000 EURO/year

Invest: 250,000 EURO

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Conclusion

Resource efficiency in production, a key to sustainable growth!

1. Potential and benefits are recognised by the company with the aid of consultants
2. Concepts, approaches and methods are available
3. For the implementation, the need for independent support is particularly relevant for SMEs
4. Further training is also required by the consultants
Thank you very much for your attention!

Further information about the Effizienz-Agentur NRW:
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