



## Sandoz Integrated Energy Management

Establishing an Energy Management System according to EN 16001 and ISO 50001 standard

Sandoz Sites Kundl and Schafstau  
Jürgen Zettl, **Energy and Compliance Manager**

a Novartis company

## Agenda

- Background Information
  - Introduction Sandoz Sites Kundl and Schafstau
- What SIEM stands for
  - From single saving activities to a continuous improvement process
  - Written framework, guidelines and standards
- Organization and responsibilities
- Key aspects of SIEM activities
  - Energy controlling
  - Energy challenging
  - Energy supply
- Results till now and future efforts

## Sandoz GmbH, site Kundl

*Largest research and production site of Sandoz worldwide*



### Kundl, Austria

- Fermentation
- Synthesis ( $\beta$ -lactams)
- Sterile Precipitation ( $\beta$ -lactams)
- Process Enzymes
- Rec. Proteins
- FDFs
- Pilot Plants

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 **SANDOZ**

## Sandoz GmbH, site Schafftenau

*Acquisition by Sandoz GmbH in 1958*



### Schafftenau, Austria

- Synthesis (non  $\beta$ -lactams)
- Sterile Precipitation
- Lyophilisation
- Enzymes and hormones
- Rec. Proteins (cell culture technology)
- FDFs

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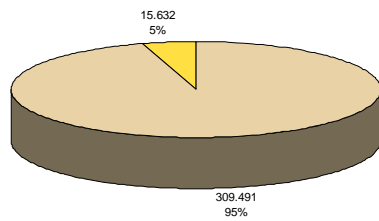


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## Energy consumption

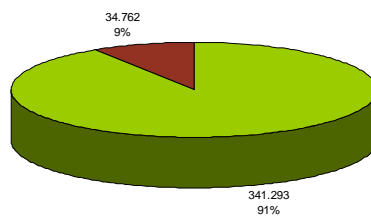
- The two sites Kundl and Schaftenau are responsible for around one third of the energy consumption of the Sandoz division and for one tenth of the energy consumption of the whole Novartis group.

Electricity consumption 2009 [GWh]



Site Kundl Site Schaftenau

Natural gas consumption 2009 [GWh]



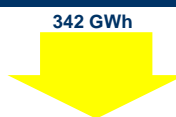
Site Kundl Site Schaftenau

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## Sandoz Energy Balance - Site Kundl - 2009

**Natural gas 100 %**  
**Fuel oil [heavy] 0 %**  
 [corresponds to 18 % of Tirol's natural-gas consumption]



**Electricity**  
 [corresponds to 6 % of Tirol's electricity consumption]

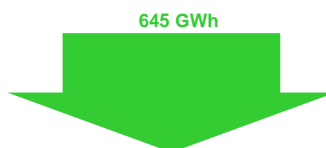
**Raw materials**  
 (feed for fermentation, solvents, ...)  
 312 GWh



**Fertilizer / Wastewater Product / Solvents**



**District heating 20 GWh**



**Cooling water**  
 [corresponds to 1/100 of the Inn-water-flow by Kundl or Inn-warming by about 0,2 °C]

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## Energy as an important production factor

- Very energy intensive production processes like large fermentations have pushed the attention very early to energy saving activities (first saving actions were made during the 1990's).
- To concentrate our future efforts the site management made the decision to establish a **continuous improvement process** concerning the energy use at the sites.
- Out of that reason the development and implementation of an energy management system as an effective steering instrument was necessary → Start was in spring 2008
- The chosen system approach is called **SIEM**  
**Sandoz Integrated Energy Management**

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## SIEM – Sandoz Integrated Energy Management

Sandoz Integrated Energy Management (SIEM) is a key initiative with the goal of integrating the careful use of energy as an essential production factor into our daily work. In order to increase the energy efficiency our products are manufactured and decrease associated costs.

**S**ustainable development (cont. & sustainable improvement, environmental protection, resource management)

**I**mprove energy efficiency (intelligent optimization of existing plants, processes & behaviours)



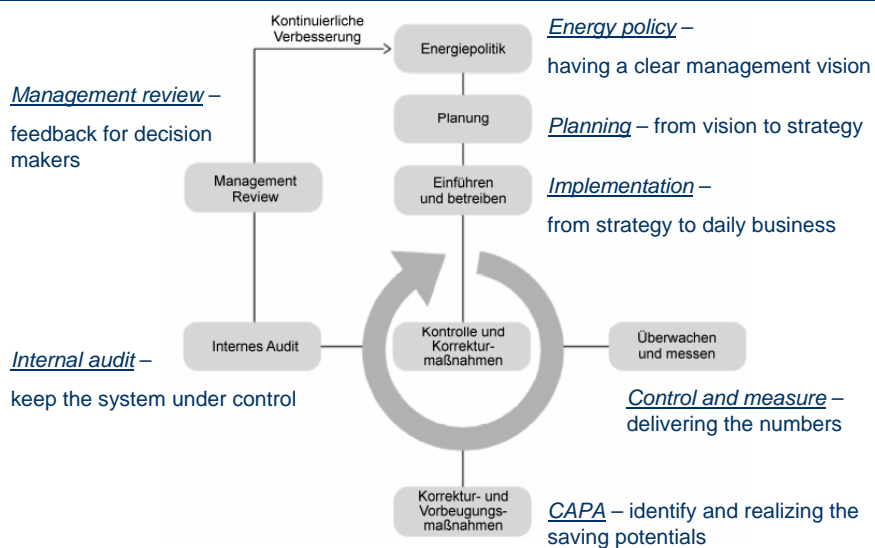
**E**nergize competitiveness (reduction of energy cost for production process)

**M**aximize engagement (the involvement of ALL employees is important)

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## SIEM - the way from single saving activities to a continuous improvement process



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## SIEM - milestones since 2008

- May 2008 First meeting of the energy committee
- Summer 2008 Energy policy and strategy planning
- Autumn 2008 Official start of SIEM as a key initiative  
Pr (Draft) EN16001 is available
- Autumn 2008 – Spring 2009 Implementation of the necessary structures and defining/realizing the first CAPA's according to EN 16001
- Spring 2009 – Winter 2009 First internal audit of the SIEM approach
- 2010 Start of quarterly management reviews
- Summer 2010 Official certification of SIEM according to EN 16001 by TUEV, as first within the Novartis group

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## Framework - Energy policy Sandoz Austria

- The energy management system is a supplement to the existing environmental management systems like EMAS (Environmental Management and Audit Scheme) and ISO14001.
- So the energy policy is a covalid / complementary document of our existing environmental policy.
- Key facts:
  - The Sandoz management confesses to the careful use of energy and considers energy efficiency in his management decisions.
  - Our energy goal is to reduce the amount of energy utilized annually per ton of product, and thus the volume of pollutants emitted per ton of product.
- The energy policy is part of the environmental statement and also over the Intranet/Internet available for employees, customers and suppliers.

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## Framework - guidelines and standards

- SIEM written manual as covalid / complementary document to the existing HSE written manual.
- Novartis CHSE Energy Guidelines 13 and 14
- ISO 14001 for environmental management systems
- European Committee for Standardization EN 16001  
“Energy management systems – Requirements with guidance for use“  
published in autumn 2009
- ISO 50001 for Energy management systems coming in late 2010, a draft is already available. The ISO standard is following the requirements of EN 16001.

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## Organization and responsibilities within SIEM

- **Site Energy Manager:**

- He is responsible for the internal and external agendas of the energy management at the sites and guarantees the function of the system elements according to the Novartis Guidelines and EN 16001.

- **Energy Committee Sandoz:**

- The ECS consists of representatives of the technical and producing departments as well as the HSE and guarantees the internal information exchange. It decides on the basic activities and approaches within the scope of SIEM.

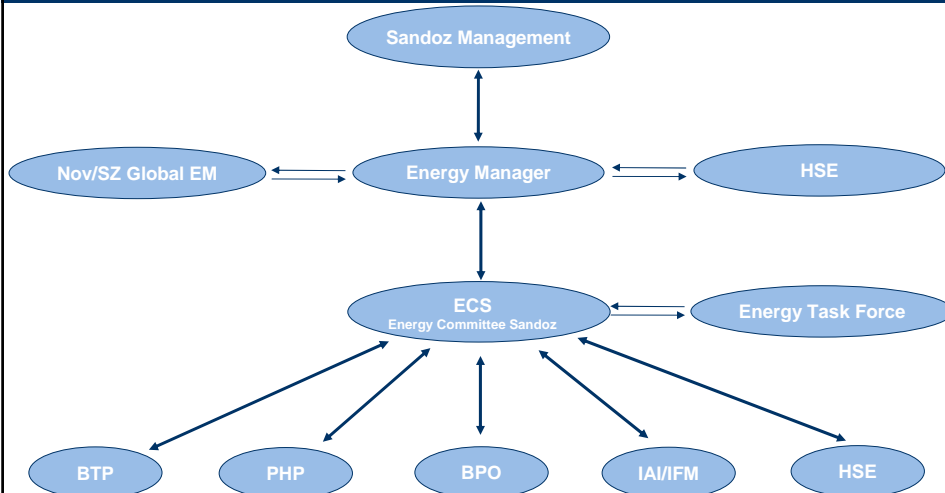
- **Energy Task Force:**

- The ETF checks together with plant teams systematically the energy efficiency of the existing plants and processes. The Team then makes optimization proposals, considering the energy system connections and resources at the site.
- The realization of projects is done through the respective plants.

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## Organization and responsibilities within SIEM



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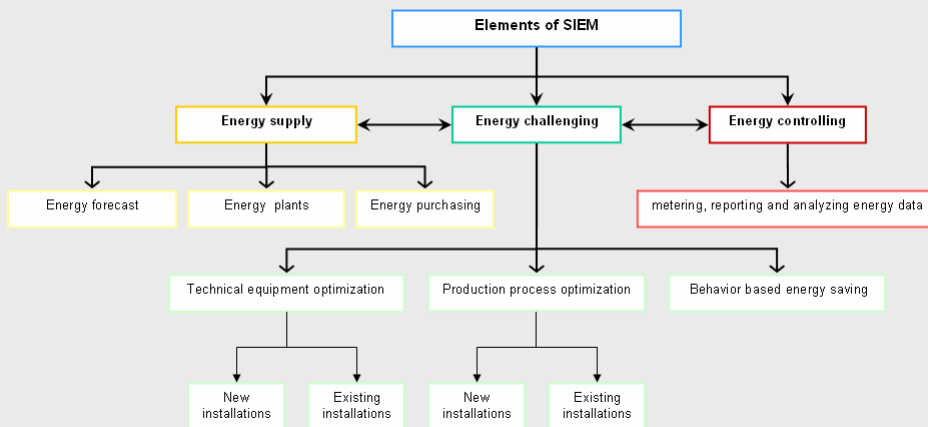
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## Key aspects of SIEM activities



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## SIEM activities - Energy supply

- **Energy forecast:** Every six months an energy consumption preview is provided to the site management. The data of production planning, power demand figures and the planned energy efficiency measures are the base.

- **Energy plants:** The department heads of the central utility systems are responsible for improvements of the energy efficiency of the utility plants (steam boilers, compressors, water supply, etc.).

The specific energy efficiency (energy demand per unit, e.g. kWh/Nm<sup>3</sup>) of the single mediums is measured continuously and documented monthly in a so called energy journal. More than 50 different Medium KPI's are available.

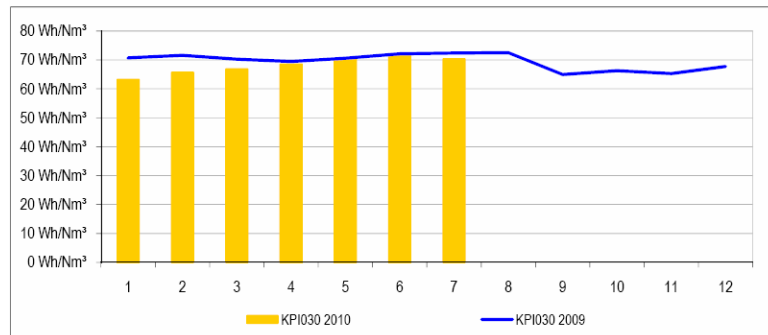
- **Energy purchasing:** Energy purchase is made in close cooperation with the energy forecast. Financial questions are dominating but also possibilities for the purchase of green energy are challenged.

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## Example Energy plant KPI – Compressed air

30	BEZEICHNUNG: Eta LB 2,6 inkl.LBE	TAG: IEB:BES_KPI030.calc	STAND: 07/2010
MONAT	2010	2009	BEMERKUNG
01-12	68,1 Wh/Nm <sup>3</sup>	-4,1% 71,0 Wh/Nm <sup>3</sup>	Monatsdurchschnitt



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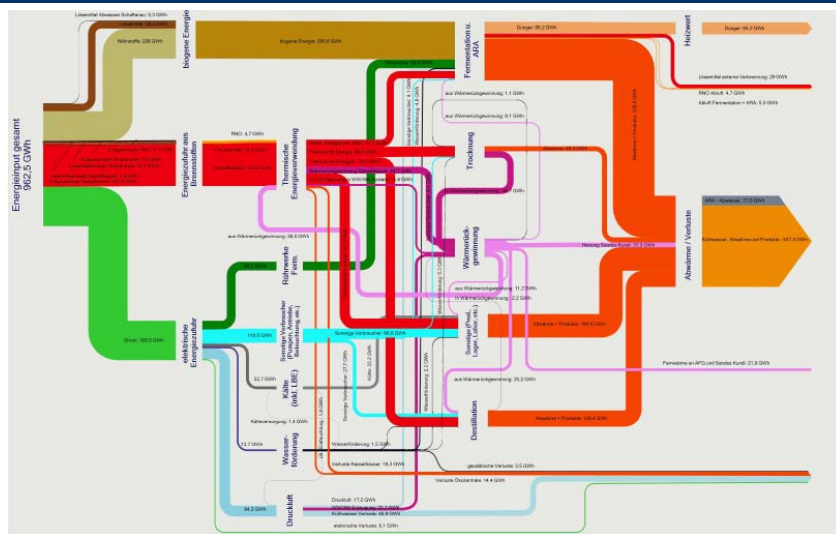
## Energy controlling – metering and reporting

- The energy use is continuously tracked through approx. 7000 measurements.
  - The data is evaluated monthly in the form of so called **energy reports** (excel sheet based, self development).
  - The data is available sorted after medias, buildings and organisation elements to all employees over the intranet.
  
- With the help of the consumption data from the energy reports and the KPI's of the central utility plants the **specific energy consumption per product** is pursued and documented in the plant production reports.
  
- **An energy flow diagram** shows the most important site energy aspects and is provided yearly.
  - The used software elsankey pro was implemented 2008 at the sites Kundl and Schafnau for the first time. Because of this preliminary work the software can now be used Novartis wide by other sites in their local software potfolio (only software licenses has to be bought by the sites individually).

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## Example Energy Flow Diagram – Site Kundl 2009



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## Energy controlling – target setting

- Site energy targets are defined on a yearly base for the sites Kundl and Schaftenau by the top management in cooperation with the Sandoz global energy management and are communicated.
- The transformation into operative energy targets happens at the level of the production areas and is in the responsibility of the production area management.
- The pursuit of the fulfillment of site energy targets is guaranteed through the continuous measurement of the site energy consumption and evaluation of saving activities.
- The pursuit of the fulfillment of individual operative targets is guaranteed through the regular Novartis performance management process.

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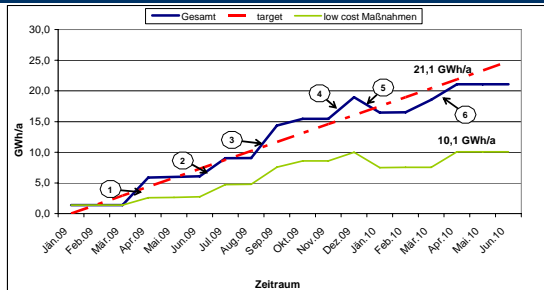
## Energy challenging/-auditing

- Existing plants and processes:
  - Energy efficiency checks are conducted by the Site energy task force for the existing processes and facilities to optimize them in accordance with the available technologies (best practice).
- New plants/processes/equipment:
  - For CAR projects the energy challenging is following the guidance of the CHSE Novartis energy guidelines, clear responsibilities at the site are defined for the follow up.
- Energy Audit:
  - The „Energy management fitness index“ of the CHSE Guideline 13.2, annex 2 as a self assessment and an audit by a external consulting company with the yearly recertification after EN16001.

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## Successful challenging of existing plants and processes



Electricity savings: **6,9 GWh/a**  
 Natural gas savings: **14,2 GWh/a**

**Saving activities:**

Nr.	Einsparung (GWh/a)	Aktion
1	3,3	- Effizienzsteigerung und Schwachstellenbeseitigung WH(Heiswasser)-Nutzung Kesselhaus -> B119: Dest.-Anlage Pos. 300 (301-305) optimieren
2	2	- Optimierung KO-Auswahl Teil 1: IB KO9
3	4,5	- Optimierung KO-Auswahl Teil 1: IB KO10 -> WBT-K-Einspeisung B158 + WVR0-Wärmetauscher B158
4	2,1	- WN-Vorwärmung im B121 für WBT-K-Erzeugung inkl. WAW-Nutzung Fermentation
5	2,5	- WH-Ventilstele KO1-8 (0/1) geht auf 0 und kann durch WVR0 bei KO10 nur teilweise ersetzt werden
6	2,5	- Selektive Bedampfung TVA (d.h. nur i.B. befindliche Anlagen bedampfen)

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## BBES (behaviour based energy savings)

- All employees are sensitized by communication/events for the energy efficiency topic and are asked to make an active contribution to the lowering of the energy consumption. A training plan for awareness raising activities is provided on a yearly base.
- Taken Actions 2010 for example:
  - Energy is a component of the yearly HSE training for every employee
  - SIEM info is a component of the on boarding suitcase for new entries
  - Actual Information to SIEM is available over the Intranet
  - Own coordinator for employee ideas with energy background
  - An energy best practice database has been established
  - A employee's newspaper appears six times a year and is dispatched to all employee households. A double page is booked for energy topics.
  - 5 TV info screens at the sites are used for communicating energy topics

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## BBES examples – SIEM Intranet page

Address: http://www.sandoz.at/novartis.intra/site/de/key\_initiatives/siem/news/index\_page1.dhtml

NAVIGATOR: Home Firma News-Center Bereiche **Initiativen** Mitarbeiter Services

Übersicht  
Diversity & Inclusion  
LEAN  
PRO  
NES EBR  
**SIEM**  
\* News  
\* Was ist SIEM?  
\* Energy Controlling  
\* Energy Task Force Y10  
\* Initiative 2010  
\* Best Practice  
\* Links/ Downloads/ Kontakte

SIEM News

« Previous 1 2 3 Next »

**Neue best practice Beispiel verfügbar!!!** 27-08-2010  
Drei neue Best Practice Beispiele aus dem Bereich BPO zu den Themen HVAC, Heizungspumpen und Belüftung stehen ab sofort in der Best Practice Datenbank zur Verfügung. Wir danken den Einzelnehmern für ihr Engagement.

**Energieportingpool geht in die zweite Runde** 09-09-2010  
Ab sofort steht die zweite Version des Energieportingpools online zur Verfügung. Profitieren auch Sie von den Neuerungen und verfügen Sie den Energiebedarf in Ihrem Verantwortungsbereich jetzt noch einfacher.

**Zertifizierungserfolg nach EN 16001** 06-08-2010  
Erfolgreicher Energiemanagementzertifizierungsaudit durch den TÜV Österreich für die Standorte Kundt und Sulzthalau

**Die Energy Excellence Awards 2010 sind eröffnet!** 09-07-2010  
In diesem Jahr steht die Veranstaltung unter dem Motto „kleiner Fußballclub, großer Gewinn.“ 2010 werden speziell kleinere Projekte gewürdigt, die durch ihre Replizierbarkeit auch in anderen Werken eine große Wirkung haben können. Die Einsendefrist für Projekte läuft bis 10. September 2010.

**Erfolgreicher Abschluss des Projektes Energiemanagement 2010 für Österreich** 10-06-2010  
Das Ziel des 2009 gestarteten Projektes war es die Umsetzung von Energiemanagement in Österreich voranzutreiben.

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1 Key Initiatives  
2 SIEM Intranet content  
3 SIEM News start page

## BBES examples - Knowledge management

- Energy "best practice" collection - learning from the best!
  - Best practice stands for solutions or methods which lead to top achievements and so are a model for a takeover by others.
  - The collection improves the site internal communication of successfully implemented energy projects. The examples are one pagers and sorted after categories (e.g., steam, WRG, pumps, impulses, cold, air pressure, light, etc.) and for every interested employee any time observably.
- Employee Idea collection and Mitarbeiterideenteam Klima&Lüftungen
  - from September 2009 till January 2010 more than one hundred ideas were collected, realized saving potential 100k €
  - An employee idea team was founded for the evaluation of the saving potential concerning HVAC systems at the two sites
- Standard procedures are existing for pump system evaluation, insulation improvement/heat images, compressed air leakages

## BBES examples – Best practice collection

**WW90 Einsatz im Teillastbetrieb eines Adsorptionstrockners (Lüftung)**

- Vorher**  
Bei den bestehenden Lüftungsanlagen mit Adsorptionstrocknern, zur Versorgung von Räumen mit unterschiedlichen Raumluftanforderungen, erfolgte die Aufheizung der Regenerationsluft für die Entfeuchtung mit Dampfstrom.
- Nachher**  
Bei der Erweiterung der bestehenden Lüftungsanlagen (Neuschaffung einer Anlage) wurde durch den Einbau eines Warmwassergutlers, die Möglichkeit geschaffen die Regenerationsluft für das Adsorptionsrad mit WW90 vorzuheizen. Dies funktioniert im Teillastbetrieb und spart damit Dampf ein, im Vollastbetrieb wird aber auf Grund der Temperaturanforderung (20 °C) weiterhin Dampf verwendet.
- Nutzen**  
  - Reduzierung des Dampfverbrauchs über den gesamten Lebenszyklus der Anlage

**Energiesparmaßnahmen sollten so früh wie möglich bei der Planung von neuen Anlagen berücksichtigt werden.**

**Ene erst spätere Nachrüstung im laufenden Betrieb ist unter wirtschaftlichen Gesichtspunkten meist unattraktiv.**

Technik Pharma B131  
SANDOZ

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## BBES Examples – Communication

### Employee newspaper - Connect

**Erfolgreicher Abschluss des Mitarbeiterideenschwerpunktes – „MI spart Energie“**

100 Ideen wurden von den Mitarbeiterinnen und Mitarbeitern der Pharma-Abteilung eingereicht. 10 davon wurden für die Umsetzung ausgewählt. Die Mitarbeiterinnen und Mitarbeiter der Pharma-Abteilung haben sich an der Umsetzung dieser Ideen beteiligt. Die Umsetzung dieser Ideen wird in den nächsten Wochen abgeschlossen sein.

**Energie „best practice“ Sammlung – Lernen von den Besten!**

Die Besten sind diejenigen, die die besten Ideen eingereicht haben. Sie sind diejenigen, die die besten Ideen umgesetzt haben. Sie sind diejenigen, die die besten Ideen umgesetzt haben. Sie sind diejenigen, die die besten Ideen umgesetzt haben.

Diana Klein 2010

Linierte & Sicherheit

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## BBES Examples – Events

- Energy cabarett with more than 300 visitors



- Energy management workshops with the line management



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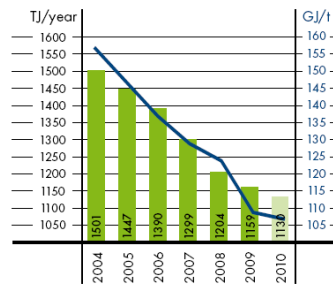
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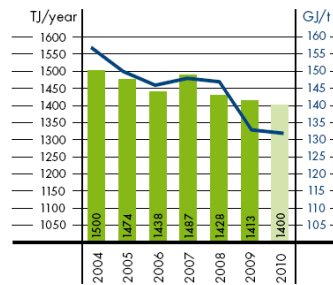
## Results

- The energy demand development over the last years is decreasing. With the help of our energy management initiative it is our target to keep this trend going.
- SIEM – Our way to more energy efficiency!

Electric power consumption



Natural gas consumption



All graphs show absolute quantities as green bars and relative quantities (per ton of product) as blue lines. Figures for 2010 are estimates based on company forecasts.