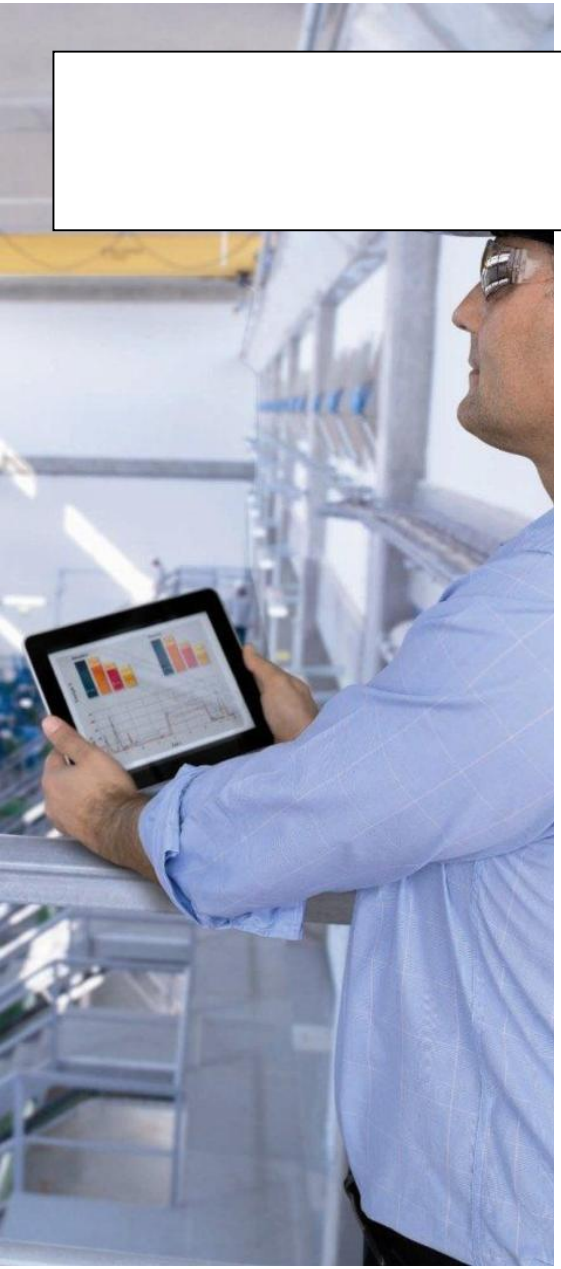

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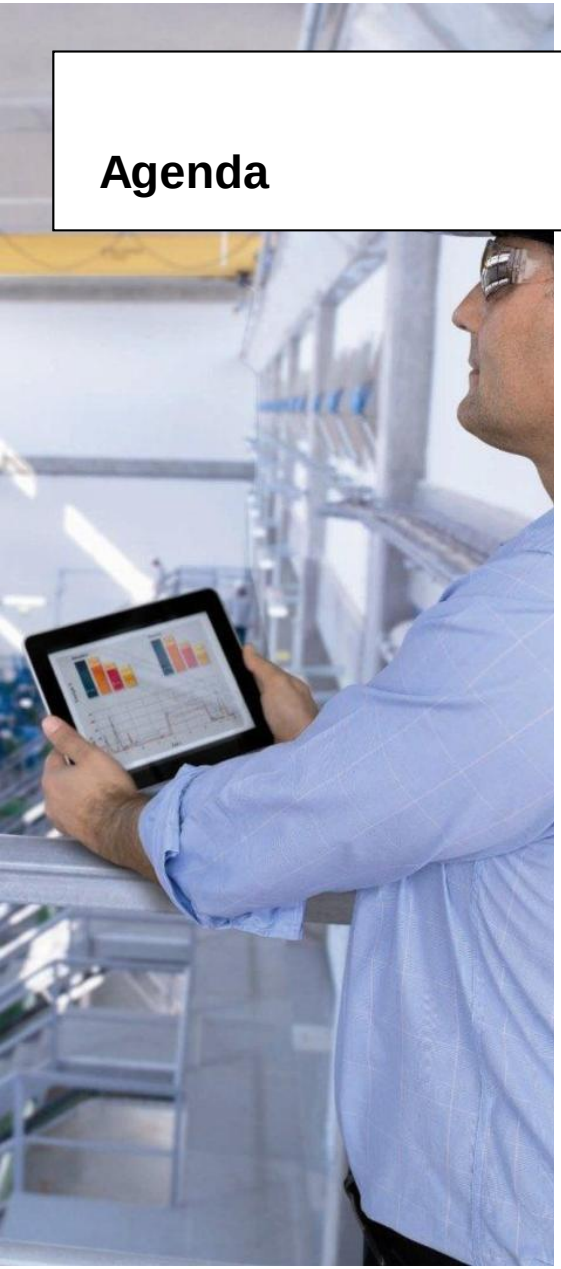
Energy Data Management for Paper Industry

SIMATIC B.Data

Slovene Paper Days 2012, Bled

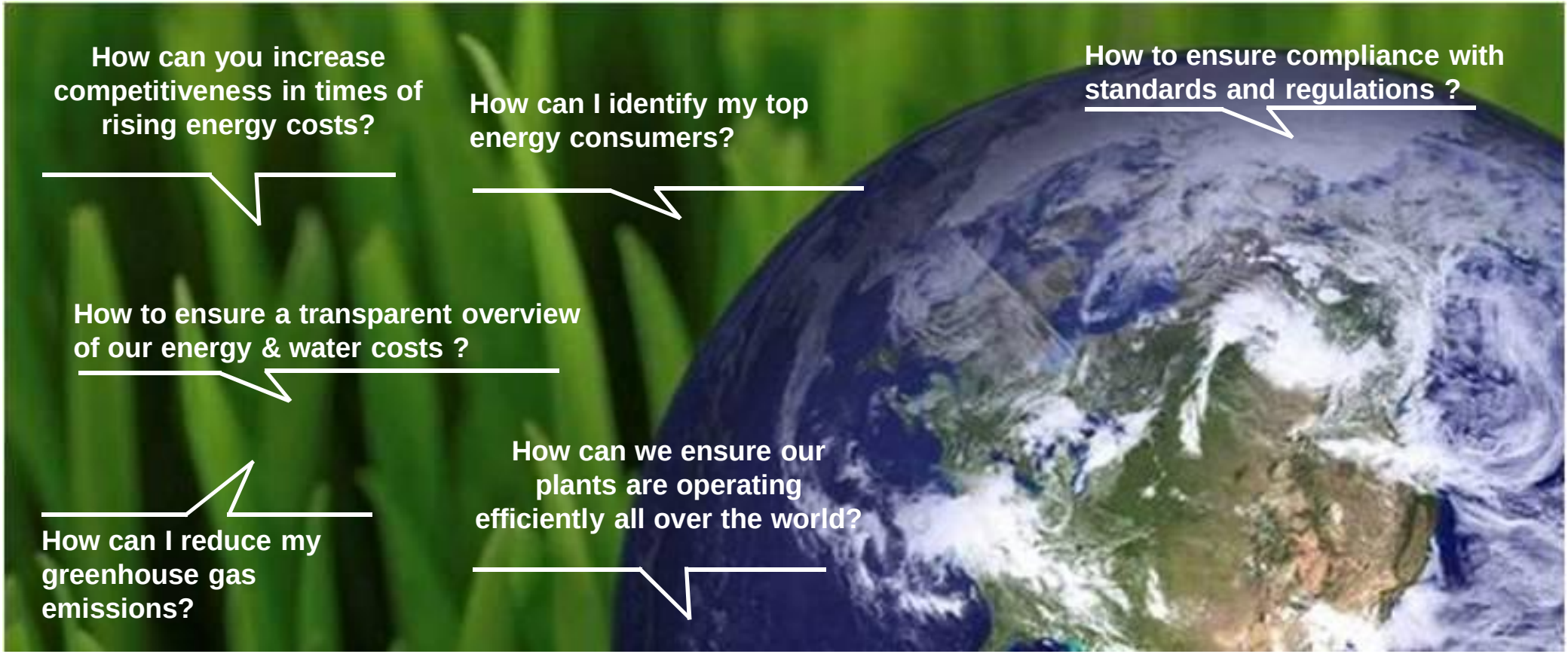
Nov. 21st 2012

Agenda



- Introduction: customer questions, challenges and answers
- Overview Energy Data Management: what is EDM?
- Key functionalities of Energy Data Management
- Benefits of Energy Data Management
- Case study Lenzing AG

Your challenge our answer



Energy Data Management helps you to find answers for the key challenges of energy consumption in industry

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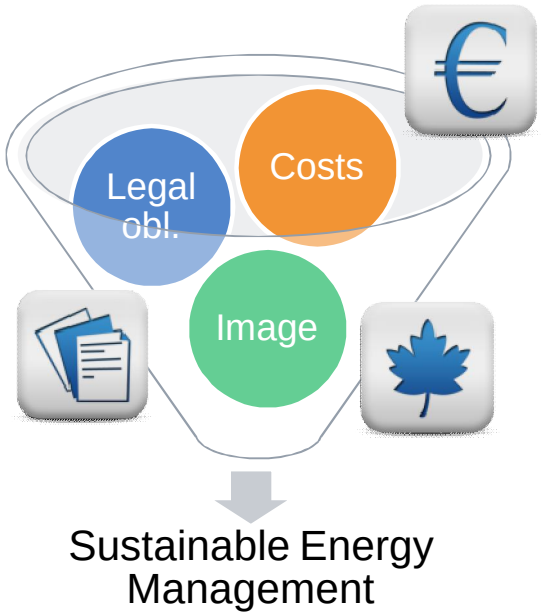
Costs	Legal Standards	Image
Challenges		
■ Energy costs become a **significant cost factor** in industry ■ **Energy costs** for electrical power and oil rise rapidly	■ Legal obligation for the **reduction of CO2** (Greenhouse gases) ■ **Country specific** regulations ■ **ISO** 50001 Energy management ■ Waste and waste water **regulations** ■ **Emissions** (NOx,….)	■ **Sustainability** and **green production** are getting more and more into focus ■ **Green image** is increasingly important in a highly competitive market
Energy Data Management Answers		

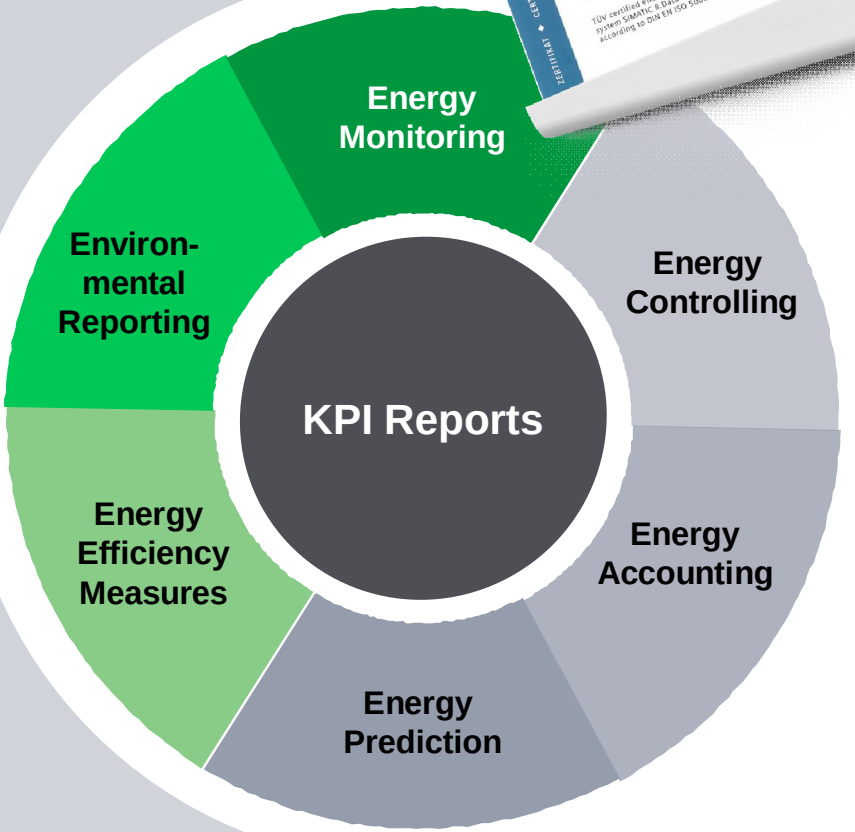
■ **Reduction** of energy costs by
  ■ Reducing energy **consumption**
  ■ Optimizing energy **procurement**
	■ Support of **ISO 50001**
	■ CO2 **reporting**
	■ Long term **archiving**
		■ **Sustainability reports** (Sustainability Index)
		■ CO2 or water **foot prints**
		■ Invests into **environment targets**

What is Energy Data Management?



"Identify"

"Optimize"



Energy Monitoring: Continuous supervision of power consumption for plant or parts of production

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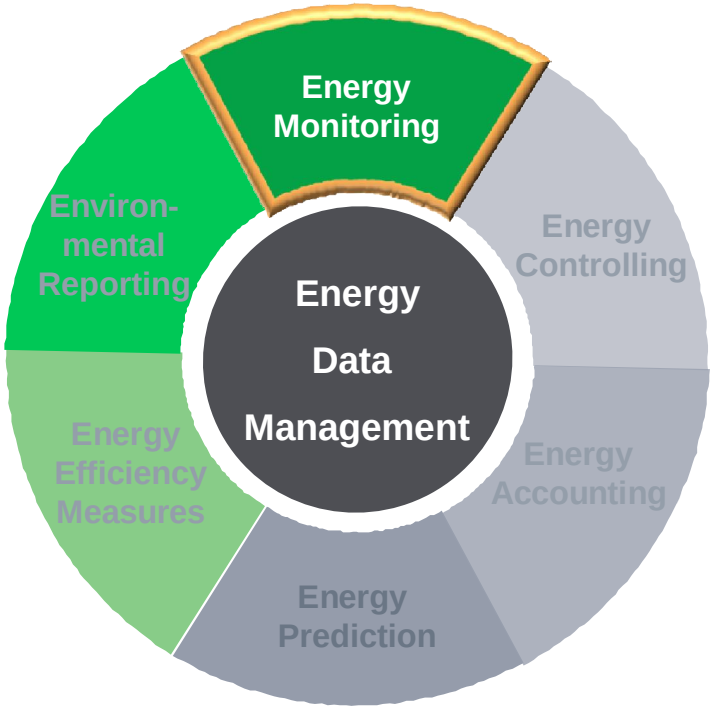


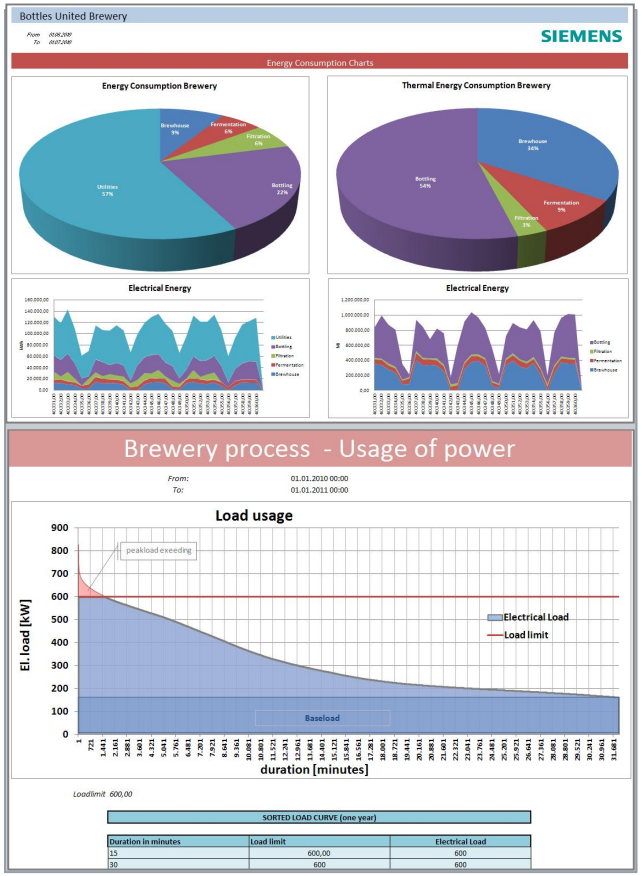
Features & Benefit

Energy consumption overview

- Energy consumption for total plant and per production area incl. trend
- Total KPI for production efficiency (kWh/product)

Sorted load curve of power consumption

- Usage and duration of electrical power consumption per report period
- Identify potential of power usage over level and defined period



Energy Controlling: Reports and dashboards for on demand transparency on consumption and costs

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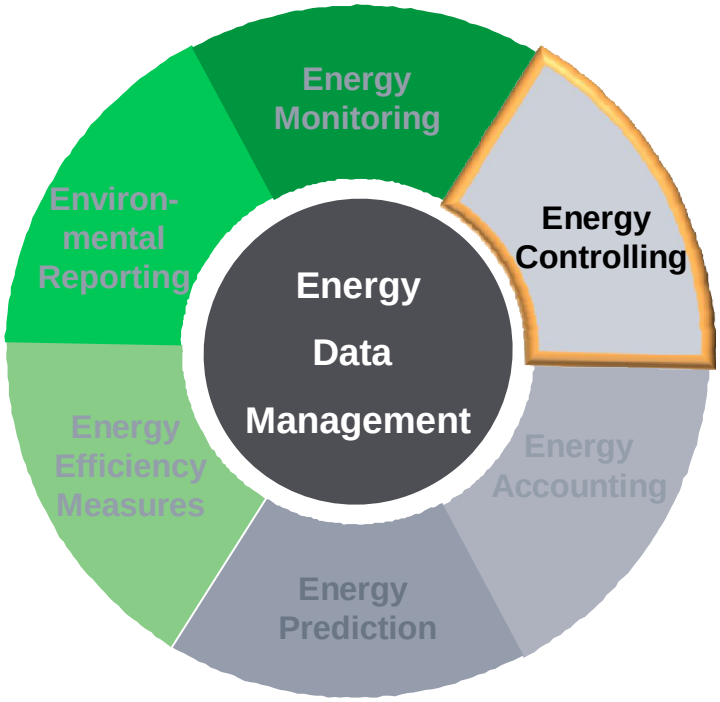
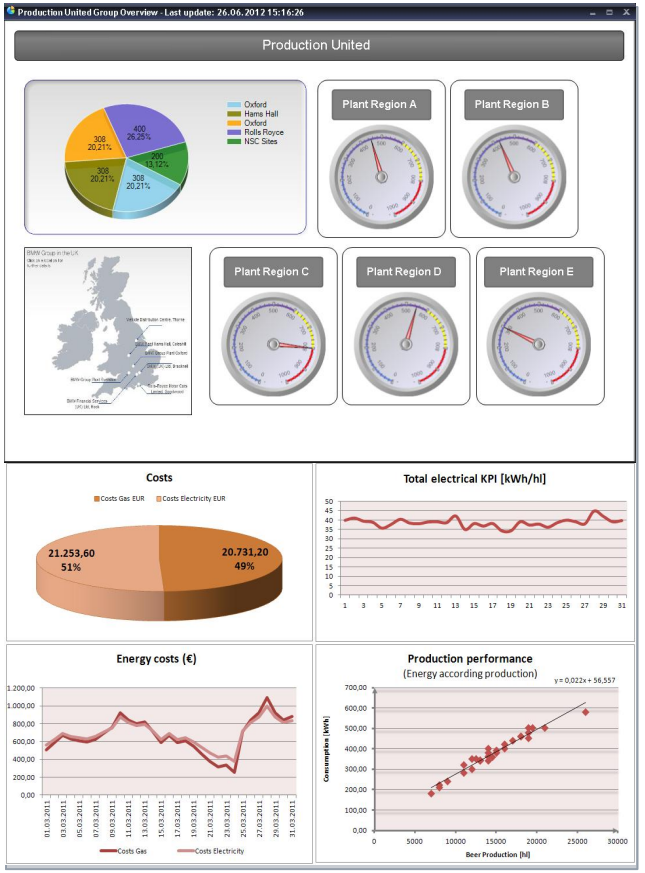


Benefits

KPI Performance and efficiency reports, e.g.

- User-friendly dashboard and reports with customized information
- Controlling of target achievement and benchmark information
- KPI performance per media, production site, plant area, key equipment
- Plant performance (production-based energy cost)
- Batch & product related KPIs



Energy Accounting: Automated accounting of energy costs to cost centers/departments

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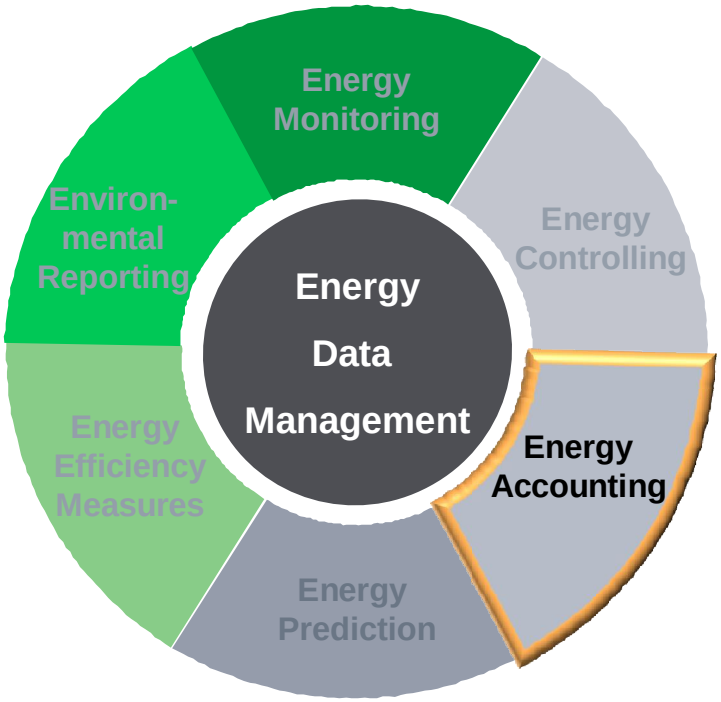
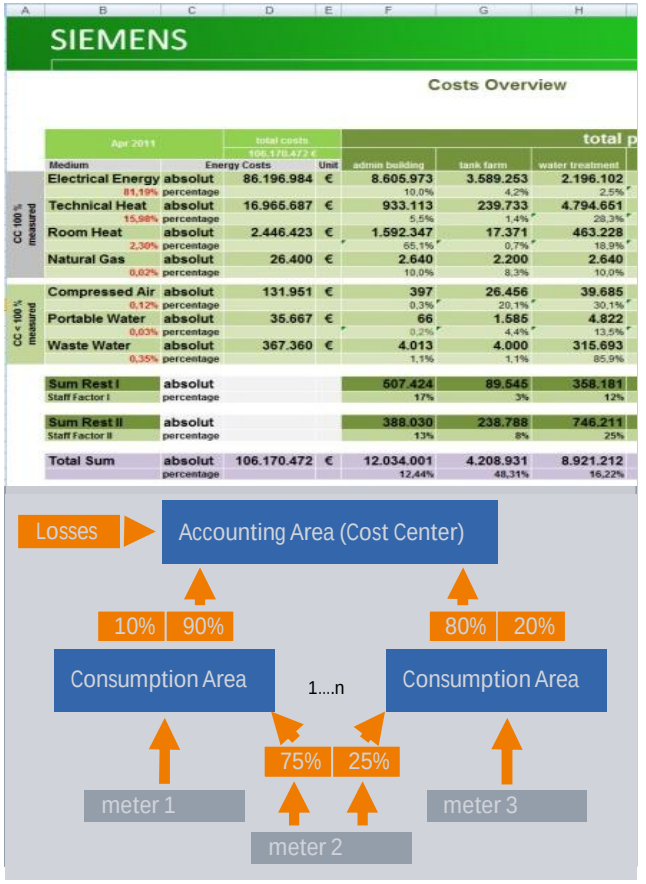


Features & Benfits

Cost transparency for all segments

- Accounting to cost centers/departments according to usage
- Create awareness for energy consumption and costs
- See tendencies (Rising, falling)
- Contribution of each department to energy policy (e.g. -5%)
- Compare usage with: previous period/period of last year
- Provide information to ERP Level



Energy Prediction: Optimize the energy procurement by predicting the energy consumption

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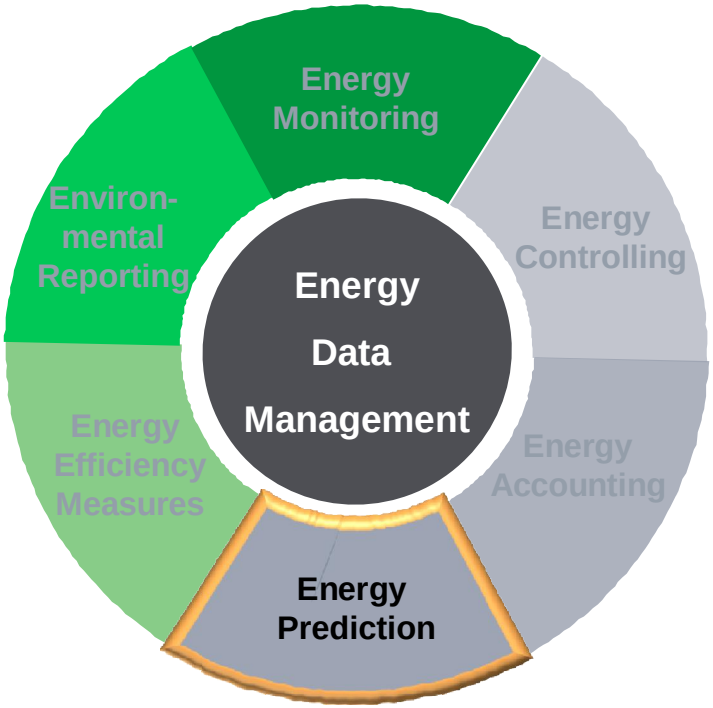


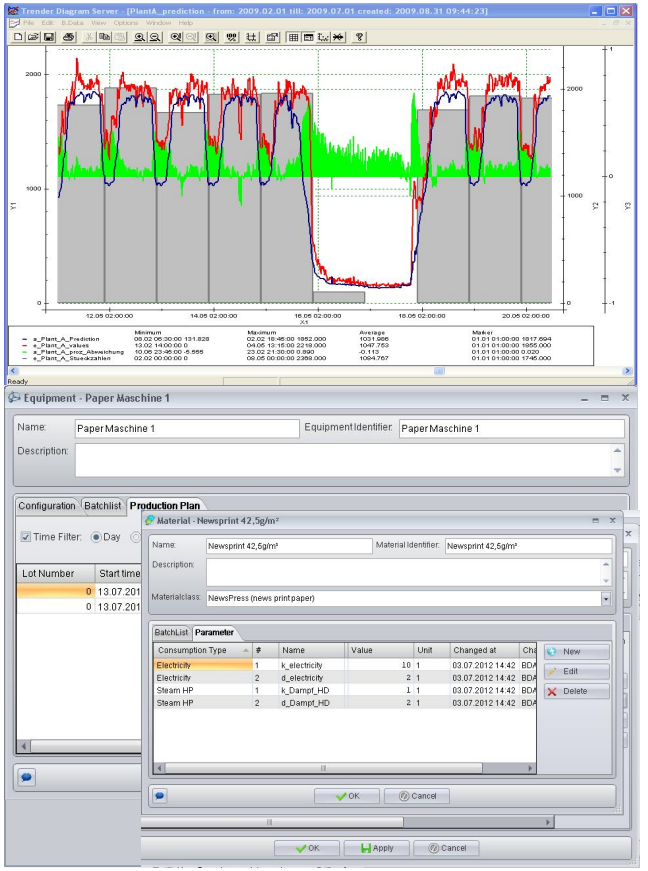
Benefits

Be able to look to the future

- Using the appropriate prediction model
  - Based on production plan
  - Weekly profiles
- Basic information for buying and selling of energy

Optimize the energy procurement

Compare energy prediction to actual demand



Energy Efficiency Measures: Manage Energy Efficiency Measures and be comply with the ISO 50001 regulation

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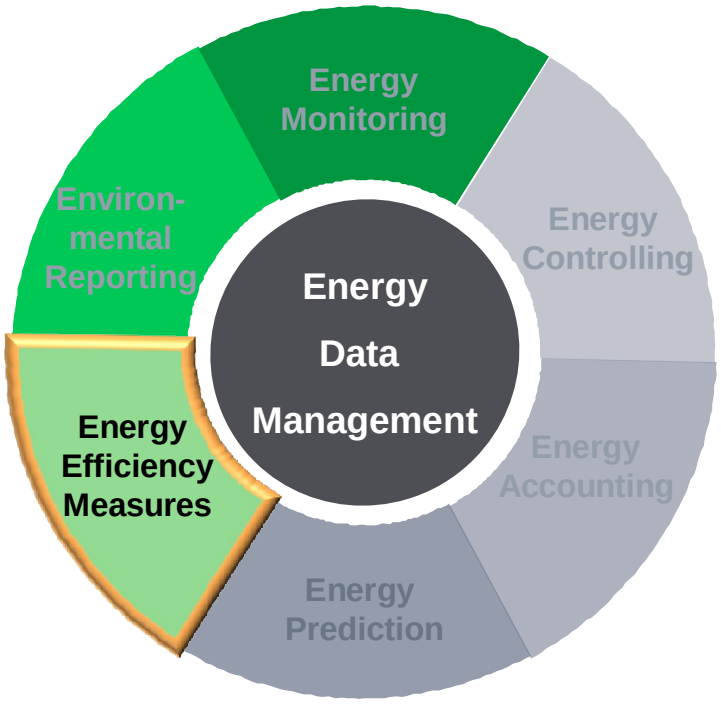


Benefits

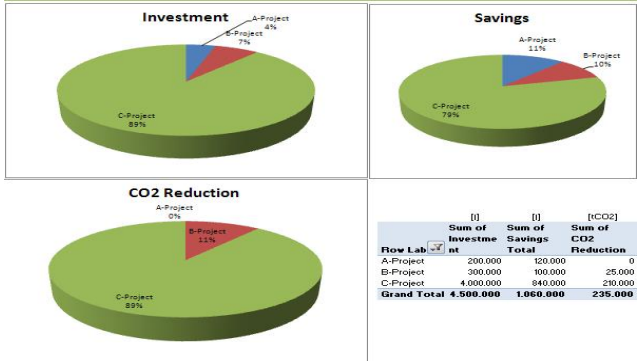
Management of Energy Efficiency Measures

- Comparison of measures before and after the implementation
- Display of
  - Saving potentials
  - Investment costs
  - CO2 impact
- Combine the capabilities and the current situation in an management report

Energy Efficiency Project Management

Date	17.02.2012 10:20						
All Measures		[€]			[€]	[tCO2]	[Years]
Project Name	Category	Saving	Region	Business Unit	Investment	CO2 reduction	Payback
Compressed Air	C-Project	52	Linz	IA	10.000	501	18,1
EnergieDataManagement Syster	A-Project	120	Munich	DT	15.000	1500	9,3
Ice Water	D-Project	4000	Praha	DT	11.000	4000	2,0
Lighting	B-Project	4100	Linz	BT	1.000	0	0,2
Water leakage	B-Project	400	Berlin	BT	1.000	0	2,5
Pay Back < 2 years		[€]			[€]	[tCO2]	[Years]
Project Name	Category	Saving	Region	Business Unit	Investment	CO2 reduction	Payback
Lighting	B-Project	4100	Linz	BT	1.000	0	0,2

Measures by Category



Row Lab	[t] Sum of Investment	[t] Sum of Savings Total	[tCO2] Sum of CO2 Reduction
A-Project	200.000	120.000	0
B-Project	300.000	100.000	25.000
C-Project	4.000.000	840.000	210.000
Grand Total	4.500.000	1.060.000	235.000

Environmental Reporting: Automatic provision of sustainability reports on each organizational level

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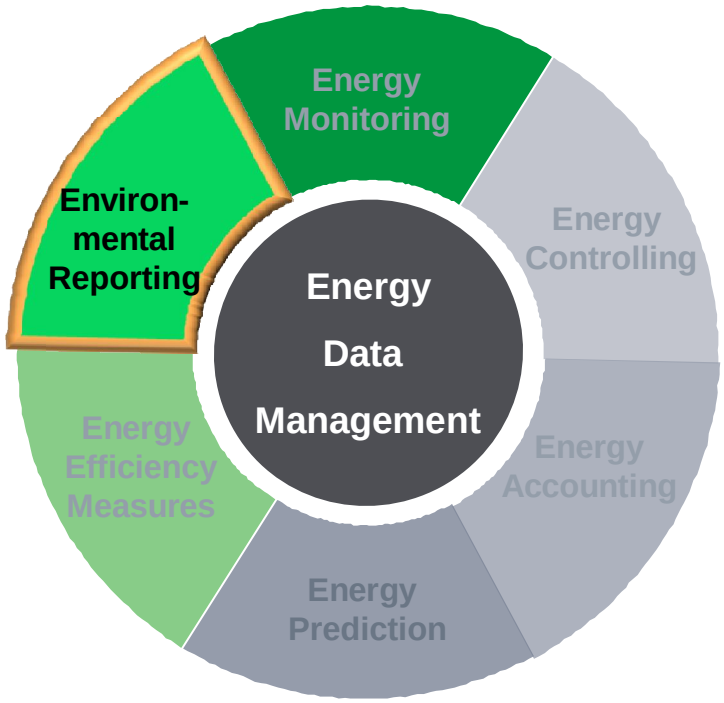
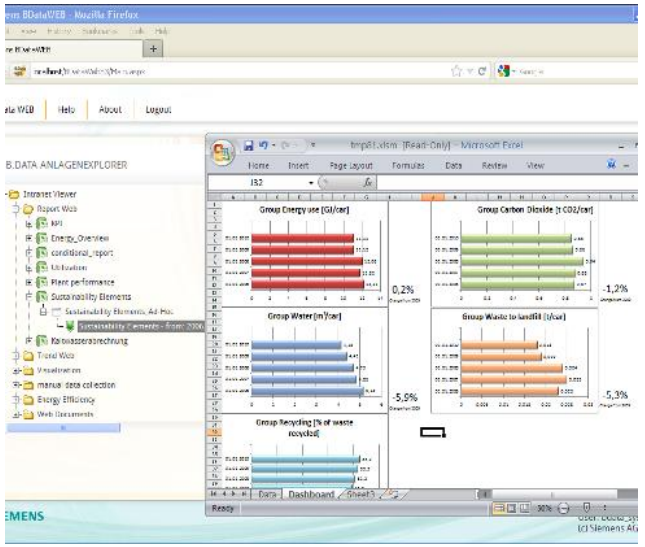
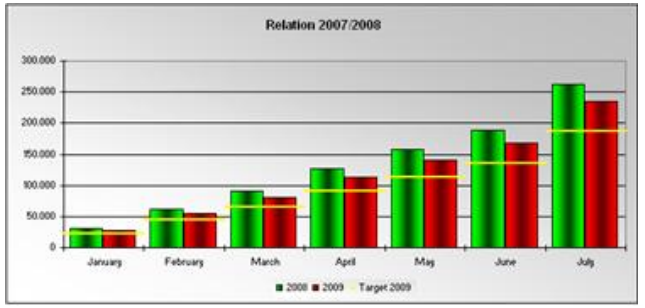


Benefits

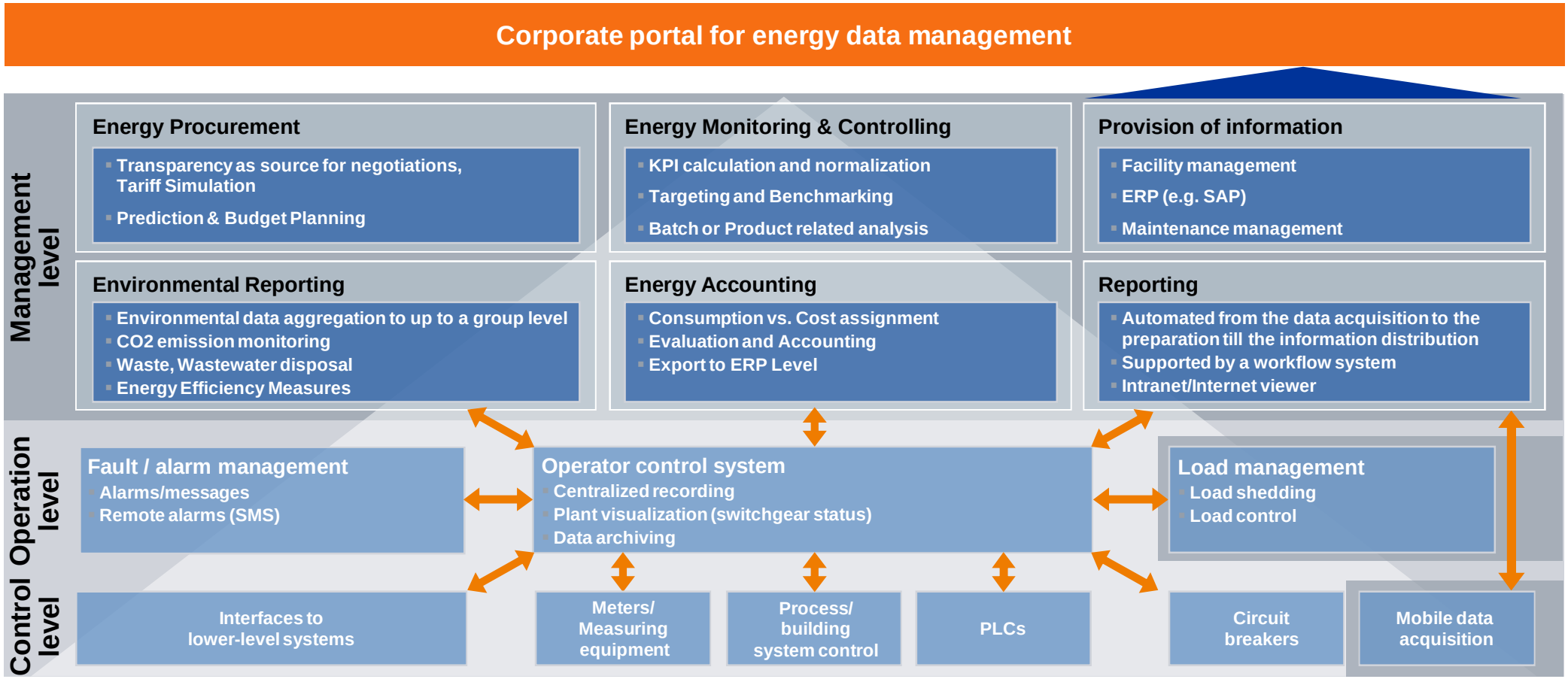
Transparency about all environmental topics

- Fast overview about sustainability issues on corporate, plant and process level
- Data consolidation over multi sites
- Automated calculation & reporting to reduce manual effort
- Flexibility to react on increased requirements





Energy Data Management



Benefits of Energy Data Management - Summary

Energy Efficiency

- Improvement of total **plant efficiency**
- Overview of **optimization potential**

Savings

- Reduced energy costs due to **reduced consumption**
- **Improved procurement conditions** due to better predictability (Energy tariff model optimization)

Transparency

- **Transparency** on energy and media consumption, costs, emission
- **Allocation** to consumer and cost center
- **Predictability** and target controlling
- Improved planning reliability and **basis for decision making**

Meet Legal Standards

- Support of **ISO 50001** process
- **Sustainability reporting**
- Reports of **quality audits**

Awareness

- Increased energy **consumption- and cost awareness**
- **Prove of sustainability** and green production

Sustainable Invests

- Integration in **existing system**
- Integration of **existing measuring equipment**
- **Seamless concept** (Totally Integrated Automation)
- **Scalable** solutions

Case Study Lenzing AG
Lenzing Group

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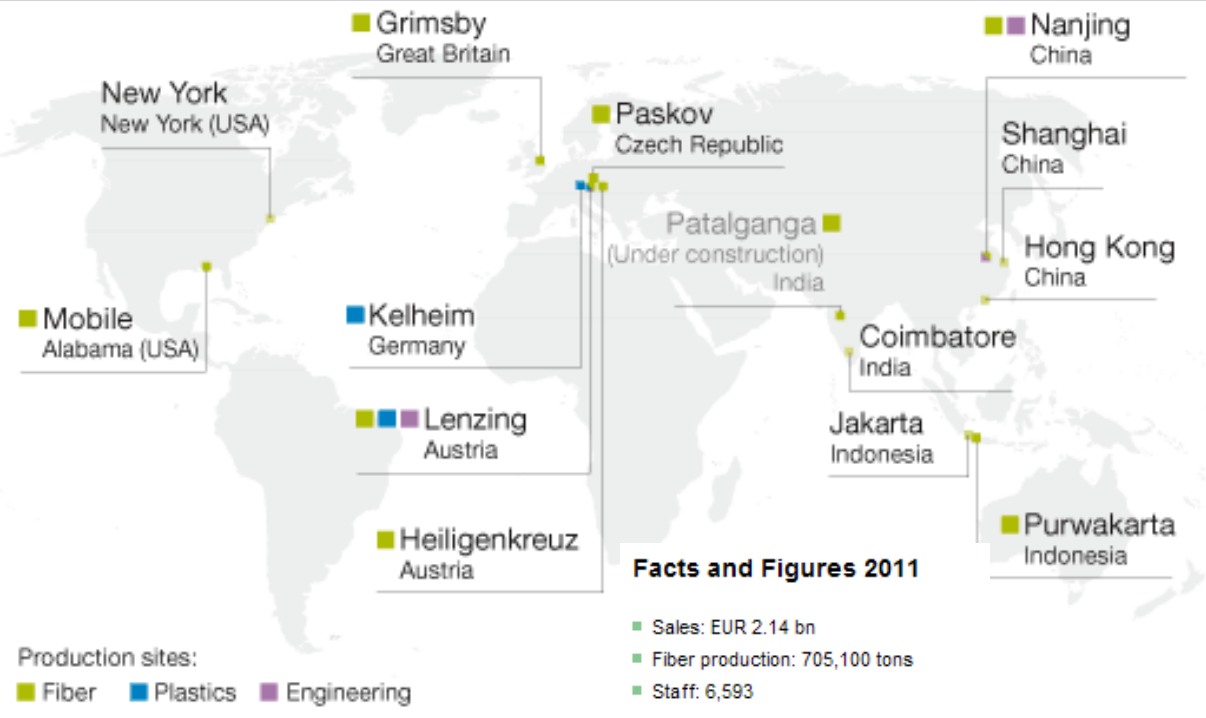
The Lenzing Group with HQ in Austria is operating world wide.



Source: http://www.lenzing.com

Tasks of Business Unit ENERGIE

Group level

- The ENERGIE business unit is responsible to develop concepts for energy providing facilities

Site level for the plant in Lenzing / Austria

- Service provider for
  - Energy and media to all Lenzing AG customers on a cost effectively way
  - Planner and operator of facilities including the grids
  - Collecting waste and sewage sludge for thermal recovery
  - Many task in the life-cycle of pulp production

Case Study Lenzing AG
Energy Management = Services for several partners

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Providing energy, requires transparency …

Business Unit
ENERGIE

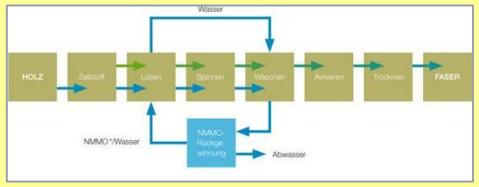
Accounting
Energy amount

Price

CC Finance
(Corporate Center)

Energy costs

Fiber, Pulp, …
(Business Units)



Energy procurement

Energy
Gas
Electricity

Wood procurement

Fuels
Shavings
Bark
Wood 1)

Transformation
Electricity / Gas -> Steam, …

Technique

Maintenance

Energy production
& distribution

Energy
Well water
High temp. water
Compressed air
Chillness
Natural water
Nitrogen
Electricity
Vacuum

1) 1 million t wood p.a.

Case Study Lenzing AG
Challenges

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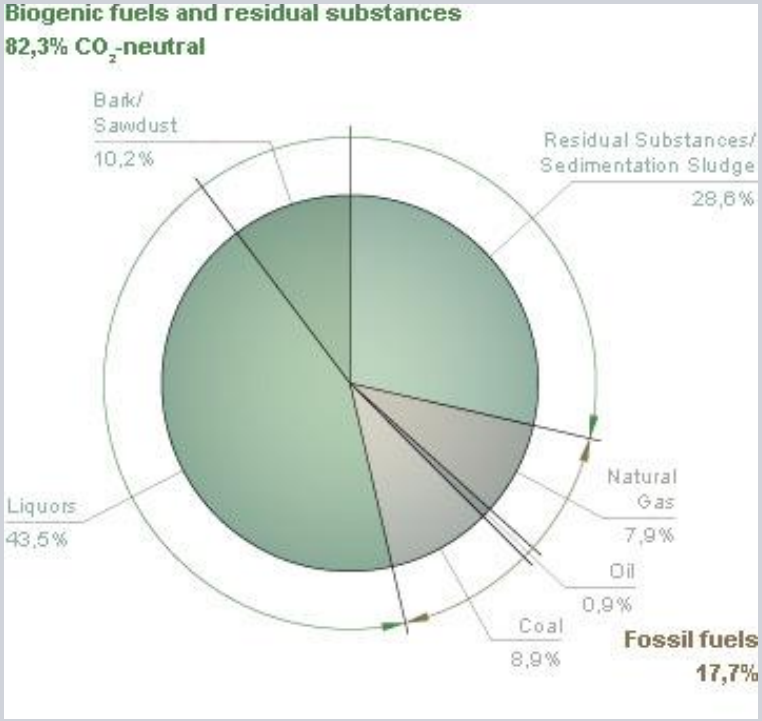
Annual fuel consumption: 13.086.200 GJ



Kinds of energy

- Water (natural-, well-, drinking-, Fire extinguisher, EB-water, VE-water)
- Steam (3 bar, 4 bar, 15 bar, 40 bar, 75 bar)
- Electricity
- High temp. water (room heating, industry heating)
- Vacuum
- Compressed air (2 bar, 4 bar, 6 bar)
- Refrigeration
- Cover gas (Nitrogen)

Source: http://www.lenzing.com/en/energy/facts.html

Case Study Lenzing AG
Challenges

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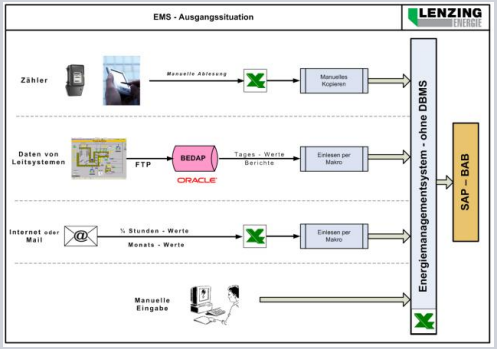
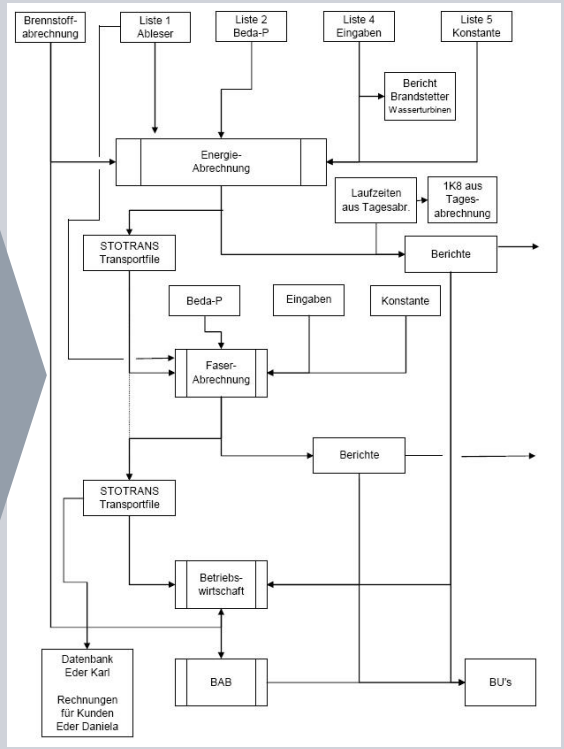
Complex, historical grown systems leads to high maintenance effort …





- A lot of data available in different formats
- A lot of Macros → complex and difficult to understand.
- Nearly impossible to change the algorithm
- Same data are available on multi places
- Historical grown system – high maintenance effort
- Missing experts with detailed know-how

Case Study Lenzing AG
Challenges

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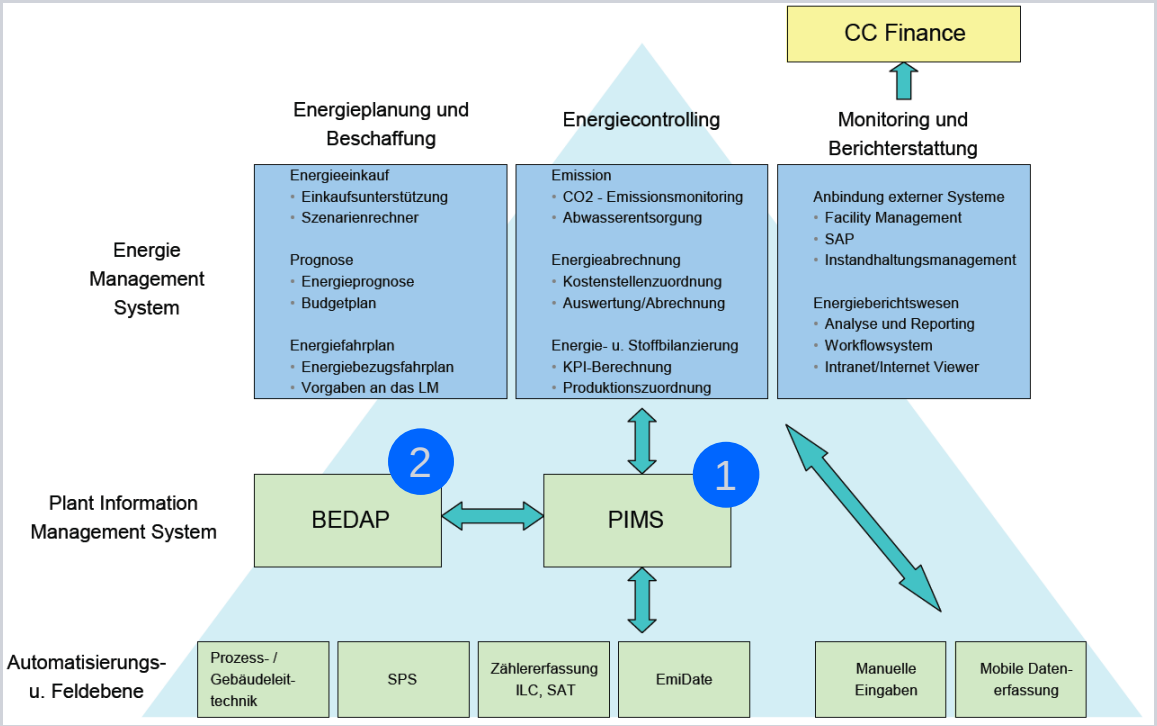
Existing systems have to be interfaced



59 Control Systems (internal development) and >40 standard control systems

1 Interfacing the existing Plant Management Information Systems (PIMS)

➔ approx. 100.000 Variables
➔ 10s cycle or on change

approx. 1.400 feeders (400V)
➔ approx. 50% of data amount

2 Acquisition of all mentioned energy and media data

➔ detailed assignment to Business Units
➔ CC Finance

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Motivation for Energy Management

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Major target for system implementation

- Increase the data quality
- Reduce the maintenance effort
- Reproducibility
- Structured approach
- Establish Energy Data Management

Main task of energy data Management

- Acquisition of all appropriate data (equipment and media)
- Calculation of relevant KPIs
- Specific efficiency KPIs (Boiler,..)
- Balancing and Accounting
  - 13 cost elements (media)
  - 220 Cost Centers

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Solution – Apply the company structure to the system

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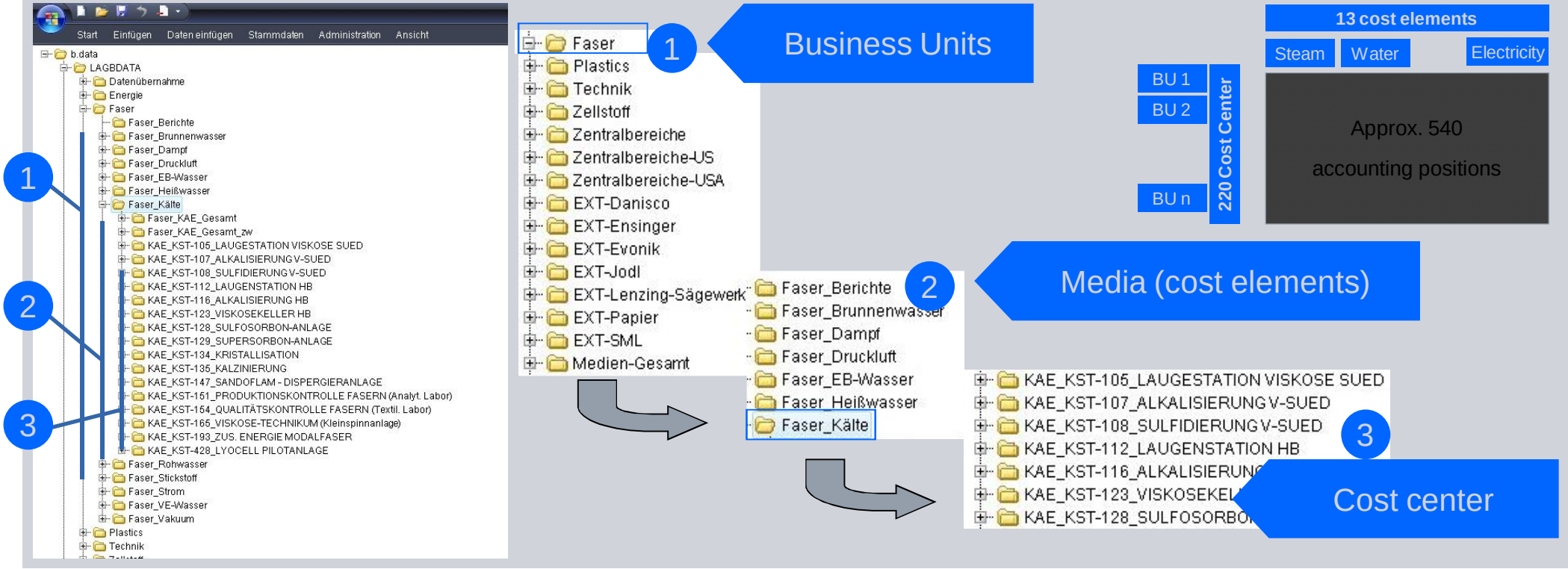
3 steps to establish the company structure



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Solution – KPI calculation and Data Validation

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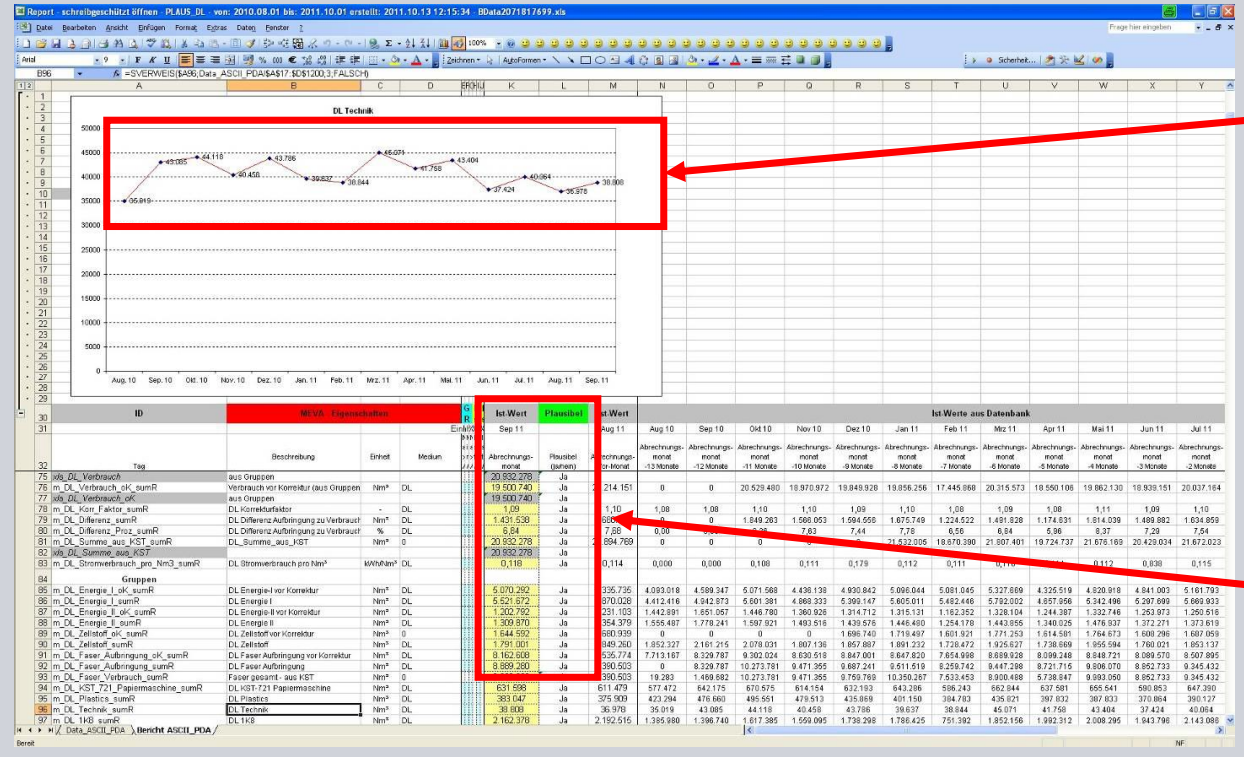
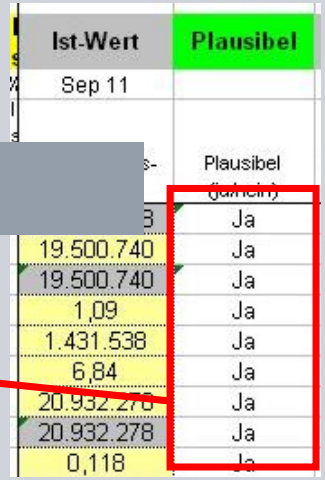
Deviation in KPIs triggers a further detailed analysis





Data Validation checks

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Solution – Example of energy reports

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Transparency over all media including cost center allocation!

VE-Wasser

Aufbringung	m3
Energie-I	267.566
Kondensataufbereitung Energie-II	66.222
Summe	333.788

Stromverbrauch	Direkt	Rohw.	Brunnenw.
	214.563	49.414	0

Stromverbrauch	kWh	kWh/m3
	263.977,40	0,79

Verbraucher	Kst.	m3	kWh
NMMO-Anlage		2.061	1.630
Kesselhaus Anlage I		140.045	110.755
Kesselhaus Anlage II		169.402	133.971
	361		
	362		
Analytlabor	151	100	79
Schwefelsäureanlage		22.181	17.542
Jodl - Auftr.Nr. 23003811	290	0	0
Summe		333.788	263.977

EB-Wasser

	m3
Aufbringung	722.109

Stromverbrauch	Direkt	Rohw.	Brunnenw.
	93.290	57.130	110.733

Stromverbrauch	kWh	kWh/m3
	261.153	0,36

Verbraucher	Kst.	m3	kWh
EB-Wasser kalt 1K8	295	3.388	1.225
MgO-Anlage	370	18.787	6.794
Zellstoff (Lastschrift VIFAS)		52	19
Viskosefaser (incl. Schwefelsäure)		578.746	209.305
Zellstoff		121.136	43.809
Summe		722.109	261.153

	m3
davon über Schwefelsäure	134.125

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Benefits based on systematic Energy Management

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Transparency ➔ Key for successful Energy Management

Shorter acquisition cycles

- ➔ Balance periods (so far “Month” new 15 Min.)
- ➔ Immediately acting (Measures < 2-3 Days possible!)

Higher transparency

- ➔ **Detailed presentation** of energy consumption and costs[1)]
- ➔ Better **process understanding** in terms of energy consumption
- ➔ **Reduction of complexity** → customer can extend the system
- ➔ **Reproducibility**, z. B. complex calculation algorithm also for other people
- ➔ High **data quality**, higher **availability**, data validation

1) Using Web Clients finance department

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Benefits based on systematic Energy Management

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Reduced effort can be used for detailed energy consideration!

Reduced handling effort
- ➔ Increased trust to data because of higher data quality
- ➔ Reduced effort for data validation
- ➔ On single system for data acquisition, data processing till analysis

Reduced system costs
- ➔ Manual data collection is still possible and necessary
- ➔ Web Client incl. data validation check

Production / Process improvement
- ➔ Tracking of efficiency KPIs and energy efficiency measures in cases of deviations

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Summary

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Consolidated findings

Further potentials available
- ➔ visible through detailed data availability
- ➔ Cost reduction by several percent points (12Mio. GJ fuel consumption)
- ➔ Further potential feasible, also in cases if you optimize since decades.

Project execution as internal project
- ➔ Only you as customer have the deep process understanding
- ➔ Complex historical grown systems can't be analyzed on a economical way
- ➔ You increase your process knowledge in terms of energy management

Summary

➔ Successful and systematic Energy Management can not be realized without Energy Data Management

Case Study Lenzing AG
Future prospects

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Rollout to further plants

Rollout to further plants

Certification according ISO 50001[1)]

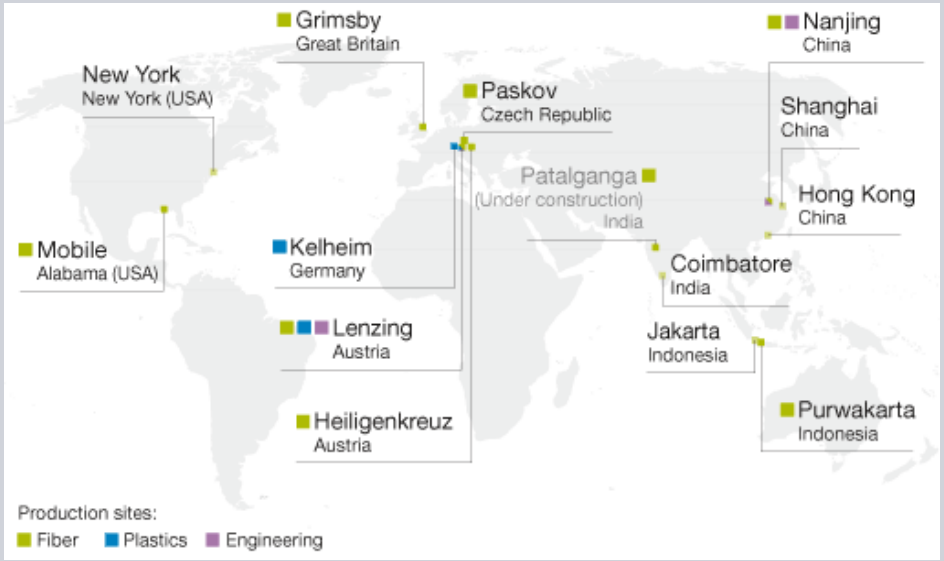
Technical extensions

➔ Batch related data acquisition, and assignment of consumption and cost information

➔ Using Benchmark information

➔ Interface to the emission monitoring system

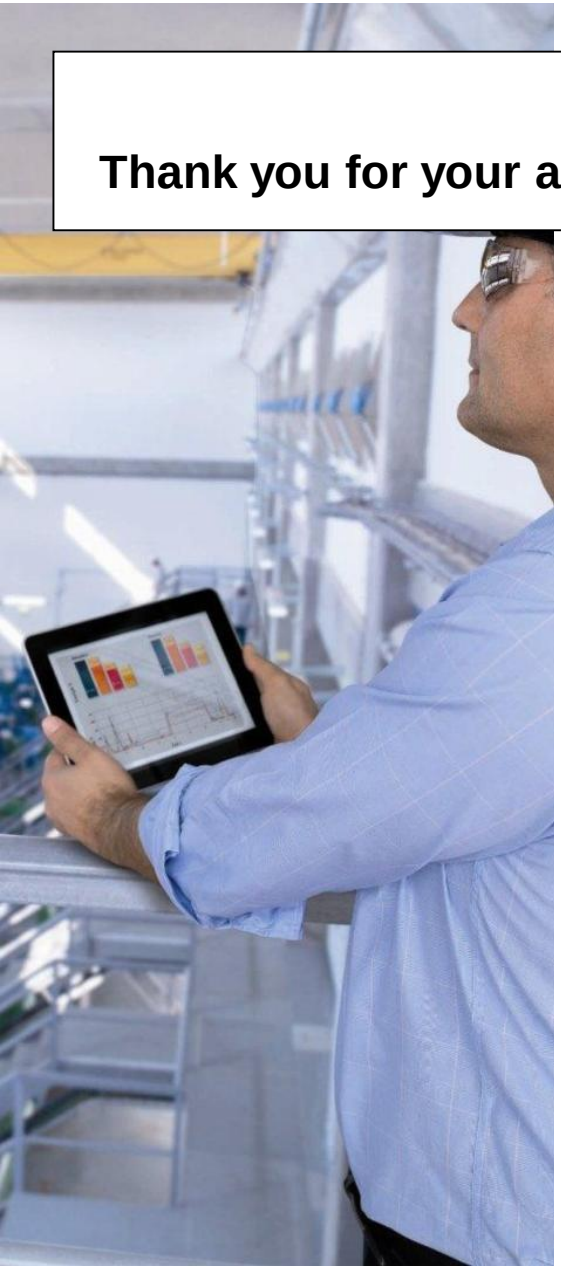
➔ Prediction of energy consumption



1) Lenzing is already certified according ISO 9001 and ISO 14001 2) EMIDATE (Siemens)

Selected References

Thank you for your attention!



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