Waste Heat Recovery
Glass Industry
since 1856

Siemens AG
Industry Sector
Industry Automation Division

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Energy consumption in the glass industry

128 TWh/a electrical Energy

- 5% saving potential is possible
- 6 TWh/a Energy saving
- Electric power consumption
  city with app. 5 Mio. inhabitants

Dallas, USA
Energy consumption in the glass industry

The Glass industry consumed more than 500 TWh/a for Energy world wide
- 125 TWh/a for electrical Energy
- 375 TWh/a for fossil Energy

Glass industry
- 25% Electrical
- 75% Fossil

Production of 1000 kg Glass means 200 to 1000 kg CO₂
Glass production

- **Batch**
  - Preparing and mixing raw material

- **Warm area**
  - Melting process
    - Temperature: 1560°C
  - Forming process
  - Cooling process
  - Energy distribution, Compressed air, water, ...

- **Cold End**
  - Cutting

**Waste heat recovery with water steam cycle**

**Utilities**

**Further processing**

Bending, grinding, ...
Industrial waste heat recovery in the glass industry

Industrial waste heat

Waste heat flow

Heat recovery system

Electrical power, heating and cooling,

Raw materials

Glass

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WHR – Waste Heat Recovery to electrical power
Proposal scope of supply

Furnace 650 T/day
450°C
70000 Nm³/h
E&A concept waste heat recovery (1 v. 2)

- Waste heat flow with 100,000 Nm³/h at 450 °C for 3 MW electrical power
- Water - steam cycle control
- Boiler cleaning system automation
-...

Industrial waste heat

- Low voltage distribution and Motor Control Center with SIVACON 8P*
- Automation System SIMATIC PCS 7 – AS (redundant)
- Distributed I/O ET 200M
- Variable speed drive system SINAMICS
- Water pump, Condensate pump
- Cooling tower
- Energy distribution

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E&A concept waste heat recovery (2 v. 2)

- Turbine and generator system
- Turbine and generator automation system
- Steam turbine
- Generator
- 3000 kW
- For own power supply
- Low voltage distribution and Motor Control Center with SIVACON 8P*

Industrial waste heat

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Industrial waste heat recovery solution fully integrated in Siemens DCS system Simatic PCS 7
Systems, components and services for the complete industrial **waste heat recovery** plant

**Systems and components**

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<thead>
<tr>
<th>Systems and components</th>
<th>Electrical components from Siemens!</th>
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<tr>
<td><strong>Boiler system</strong></td>
<td>Boiler tank, cleaning system, condenser system</td>
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<tr>
<td><strong>Cooling system</strong></td>
<td>Cooling system incl. auxiliaries</td>
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<tr>
<td><strong>Machinery</strong></td>
<td>Turbine, generator, gear, oil feed, condenser, evacuation system</td>
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<tr>
<td><strong>Civil works</strong></td>
<td>Scope depends on existing customer facilities</td>
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<tr>
<td><strong>Electrical</strong></td>
<td>Medium and low voltage switch gear, transformers</td>
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<td><strong>E&amp;I</strong></td>
<td>Instrumentation, DCS, Drives</td>
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<tr>
<td><strong>Utilities</strong></td>
<td>Piping, fixtures, insulation valves</td>
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<td></td>
<td>Pumps</td>
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<td></td>
<td>Water treatment</td>
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<td>Heat exchanger, vessels</td>
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</table>

**Services**

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<th>Services</th>
<th>Engineering</th>
<th>Others</th>
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<td><strong>Project management</strong></td>
<td>Mech. &amp; Process engineering</td>
<td>Documentation, training, acceptance,</td>
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<td><strong>Site management, commissioning</strong></td>
<td>Electrical engineering</td>
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3 MW steam turbine with generator for waste heat recovery plant Euroglas, Germany

Project: Euroglas Osterweddingen I

Dampfturbine Typ: SST-110
( previously TWIN CA 56)
Inbetriebnahme: 2006

Frischdampfdruck: 40,00 bara
Frischdampf temperatur: 424°C
Zwischendruck: 1,21 – 8,00 bara
Abdampfdruck: 0,20 - 0,35 bara
Elektrische Leistung: 3170 kW
Waste Heat Recovery boiler with patented automated cleaning system

Total length (L) : Approx. 10m
Total width (W) : Approx. 3,5m
Total Height (H) : Approx. 3,5m
Waste heat recovery plants with SIEMENS technique in operation

- **Germany**
  - Flat Glass: Euroglas in Osterweddingen
  - Flat Glass: F-Glas Scheuten in Osterweddingen
  - Hollow Glass: Ardagh in Obernkirchen
  - Hollow Glass: Saint Gobain Oberland in Bad Wurzach
  - Tube Glass: OSRAM in Augsburg

- **Belarus**
  - Flat Glass: Gomel Glass

- **Netherlands**
  - Flat Glass: AGC in Thiel
Waste heat recovery plant with 2.5 MW electrical power output for glass Scheuten, Germany, Floatglas 700 t/day

60% of electricity produced by own waste heat flow

Highly advanced energy recovery and reliable control technology

One of the project partners was Siemens. The company supplied automation technology for the plant and the turbines for energy recovery. Osterweddingen is one of the first glass plants in the world to recover a large part of the process waste heat using a modern heat recovery system. The system’s most important component is a compact Siemens industrial steam turbine with a rated capacity of 2.5 megawatts, which float glass uses to generate electrical energy from the waste heat in the process exhaust air. The energy recovery system not only saves energy, but, according to Räbiger, “the energy recovery process also helps ensure process security. By producing 60 percent of the electricity required for the float-glass plant ourselves, we are better able to cope with a power outage, for example.”

* CEO Dr. Ing. Wolfgang Räbiger in Glassfocus 2010
Good reasons to invest in waste heat recovery

**Savings**
- Reduction of energy consumption costs
- Fast amortization within a few years
- No additional personal required in control room

**Safety of investment**
- Less dependency on external sources of energy
- Less dependency on constant rising energy costs
- Installation without influence on the production process
- Installation during line operation in many cases
- Use of standard components
- SIEMENS with strong experience in power plants
- References with SIEMENS solutions in glass industry

**Environmental protection**
- Improvement of environmental protection
- Gain in green image
Energy efficiency solutions with Siemens actual brochures and film

Energy efficiency thanks to waste heat recovery
Innovative concepts for the glass industry

Energy efficiency raises productivity.

Energy Efficiency - answers for glass industry
Trends, concepts and innovative products, systems, services and solutions.
Yr 2002 • English, German, Chinese

Heat Recovery
Answers for industry.

Glass
Answers for industry.
Thanks for your attention