WHO WE ARE?

Exergy group comprises of Swedish Exergy AB (SEAB), Exergy Hamacher workshop (India), Exergy Dryers Private Ltd. (India) and Greentech Plastwood Pvt Ltd (India).

Exergy Superheated Steam Drying technology was invented at Chalmers University of Technology in Gothenburg by Claes Münter, and was commercialised by one of the seed companies from the Chalmers University of Technology, named Svensk Exergiteknik AB (SwedishExergy Technology AB).

We have developed and commercialised technologies; forced and falling film evaporation systems, air stream drying, Belt/Bed drying, heavy duty conical rotary valves, pneumatic transport systems. The Exergy Group holds key patents and key competence to deliver turn-key with its own technologies integrated with other equipment/machinery.

Our Technologies Include:

- Exergy Superheated Steam Dryer (SHSD)
- Exergy Air Stream Dryer (ASD)
- Exergy Bed/Belt Dryer
- Exergy Flue Gas Dryer
- Exergy Forced Circulation Evaporator
- Exergy Falling Film Evaporator
- Exergy Hamacher ProMaxx™ Series Valves
- Exergy Hamacher Mining Technologies
- Automation Systems

Services We Provide:

- Design and Engineering
- Consulting services
- Product Testing (with Exergy Pilot Plant)
- Feasibility studies
- Turn-key supply
- Key-part and engineering
- Project Management
- Manufacturing
- Installation
- Testing and commissioning
- Spare parts
- On-site services
- After Sales Service
Main Applications:

- Alcohol
- Algae processing
- Animal Feed
- Bagasse
- Bio- (Diesel, Ethanol, Fuel, Oil, Pellet)
- Biomethanated Effluent from distillery
- Coal
- Cooking
- Corn fibers & CSL
- DDGS & Distillers Grain
- Dietary Fibers — FIBREX
- Green chemicals
- Empty Fruit Bunches
- Energy Integration
- Fertilizers
- Fossil to biomass conversion
- Gasification
- Industrial and Municipal Sludge (Waste to Energy)
- Industrial waste water treatment
- Lignin
- Lignite
- Nuclear waste water treatment
- Oil Emulsions
- Orange peel/citrus fruit peel
- Paper Pulp
- Peat
- Pyrolysis
- Spices
- Sugar beet pulp
- Tea and other food products
- Tobacco
- Waste water treatment
- Wood Pellets Production
Exergy Superheated Steam Dryer (SHSD) is an unique drying system developed and commercialised by Exergy during the last 35 years. The technology has been used to dry numerous products in closed loop super-heated steam.

Some of the salient features are:

- Indirect heating of drying media
- High efficiency and availability
- No risk of fire, or explosion
- No emissions to atmosphere due to close drying loop
- Guaranteed complete sterilization of the product
- Short residence time (10-30seconds) and absence of air ensures a non-oxidized product
- Low floor space requirements (compact installation)
- Flexible to operate
- Easy to maintain with few rotation parts
- Easy integration with other process for energy optimization
- Large capacity in single lines
- Up to 99.9% dryness can be guaranteed
- 80-95% drying energy recovery
- Low energy consumption (Overall 96-98% plant efficiency)
- No emissions (particles or VOCs) to the atmosphere and thus no negative effect on environment
- Low total cost of production compared to conventional dryers
- Quick return on investment
EXEMPLARY SCHEMATIC
CHP CONVERSION STALOWA WOLA PLANT
SLUDGE DRYING AND COMBUSTION WITH EXERGY

**Diagram:**
- **Flue Gases**
- **Steam**
- **Thermal Oil**
- **Steam Condensate/Return Oil**
- **District Heating**
- **Vapour Condensate**
- **Wet Sludge**
- **Press Water**

**Steps:**
1. Sludge Dewatering
2. Back-mixer
3. Exergy Dryer
4. Sludge Combustion
5. Condenser
6. Flue Gas Treatment
7. Steam Turbine

**Image:**
- Dried Municipal Sludge
EXERGY AIR STREAM DRYER
LOW TEMPERATURE DRYING TECHNOLOGY

Exergy Air Stream Dryer (ASD) is a low temperature dryer designed as a standalone dryer or as a predryer together with Exergy Superheated Steam Dryer (SHSD) for two stage drying.

Some salient features are:
- Indirect heating of drying media
- High efficiency and availability
- Low emissions to atmosphere
- Low floor space requirements
- Flexible to operate
- Easy to maintain with few rotating parts
- Easy integration with other processes for energy optimization
- Small footprint

FLUE GAS DRYER

The Exergy Flue Gas Dryer was developed to meet the needs of the industry for the utilization of latent heat in flue gases from boilers. The dryer consists of feeding and discharge equipment, a separation cyclone and specially designed drying consists conduits.

Some salient features are:
- Low cost drying solution
- Use of waste heat in flue gases as drying energy
- Reduced fuel consumption
- Maximize electrical power production when used for boiler fuel
- Few moving parts and easy to operate
- Low investment cost
- Low maintenance cost
- Acts as an air filter
EXERGY BED/BELT DRYER
USE OF WASTE HEAT AS DRYING ENERGY

A simple and robust technology (patented) from Swedish Exergy AB has been used for the last 20 years. The dryer can be integrated as part of fuel feeding equipment to the boiler. The dryer consists of a specially designed moving bed, heat consist exchanger and fan. Any low grade heat available can be used in our Bed/Belt Dryer for the drying process. The desired temperature is 50°C or higher.

Low cost and robust dryer for sawdust / wood chips / bark drying:

- Using low grade heat
- Works as heat sink for power plants

All sorts of fuel and variation in feed moisture can easily be handled by the bed/belt dryer. The dryness of the final product is controlled by heat input to the heat exchanger or regulation of the fan speed. The capacity can be widely varied, from 20-100 %, while maintaining the same high efficiency.
### COMPARISON BETWEEN DIFFERENT TECHNOLOGIES:

<table>
<thead>
<tr>
<th></th>
<th>ENERGY CONSUMPTION</th>
<th>EXERGY DRYER WITH ENERGY RECOVERY</th>
<th>OPEN AIR DRYER EXCL RTO</th>
<th>EXERGY STEAM AND BED DRYER - COMBINATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Heat</strong></td>
<td>kWh/ton Evap</td>
<td>760</td>
<td>1130-1350</td>
<td>450</td>
</tr>
<tr>
<td><strong>Electrical</strong></td>
<td>kWh/ton Evap</td>
<td>40-60</td>
<td>30-50</td>
<td>40-60</td>
</tr>
<tr>
<td><strong>Energy Recovery</strong></td>
<td>%</td>
<td>610</td>
<td>0</td>
<td>(210)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>80</td>
<td>0</td>
<td>(40)</td>
</tr>
</tbody>
</table>

#### ENERGY RECOVERY

<table>
<thead>
<tr>
<th><strong>Net Consumption</strong></th>
<th>kWh/ton Evap</th>
<th>150</th>
<th>1130-1350</th>
<th>450</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Heat</strong></td>
<td>kWh/ton Evap</td>
<td>40-60</td>
<td>30-50</td>
<td>40-60</td>
</tr>
<tr>
<td><strong>Electrical</strong></td>
<td>kWh/ton Evap</td>
<td>190-210</td>
<td>1760-1840</td>
<td>490-510</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>kWh/ton Evap</td>
<td>190-210</td>
<td>1760-1840</td>
<td>490-510</td>
</tr>
</tbody>
</table>

The energy consumption for the Exergy Superheated Steam Dryer is only 20% of conventional drying technologies.

### FORCED RECIRCULATION AND FALLING FILM EVAPORATION

- **Proven Technology.**
- **No chemicals required.**
- **Effective volume reduction.**
- **Lower operating costs.**
- **Low maintenance costs.**
- **Environmentally friendly technology.**
- **All heavy metals and other contaminants are contained in small concentrated volume.**

### WHY EXERGY EVAPORATION?

#### Main features:
- Controlled heating without evaporation
- Large Flash chamber
- Tubular heat exchanger
- High flowrates
- Turbulent flow
- Steam or MVR
- Process integration

#### Benefits:
- No fouling
- High concentration
- High suspended solids
- Viscous fluids
- Batch or continuous
- Low energy consumption
APPLICATIONS

→ Industrial Waste Water treatment
→ Nuclear waste water
→ Oil Emulsions/cutting fluids treatment
→ Treatment of leachate from landfill
→ Used as a re-boiler
→ Chemical cleaning fluids treatment
→ Wash Waters
→ Hazardous waste treatment
→ Post treatment of condensate & concentrate

EVAPORATION - HEAT INPUT

Heat input

• Direct heat
  750 kWh/m³

• Multiple effect
  150-500 kWh/m³

• Steam recompression, MVR
  15-100 kWh/m³

• Vacuum evaporation (MVR)
  15-100 kWh/m³
Swedish Exergy AB acquired all assets of Karl Hamacher GmbH in 2010, including the production facility for TroMaxx® Rotary Valves & Mining Technology.

The TroMaxx® - Technology

TroMaxx® allows you to feed bulk goods from a pressurised chamber to the atmosphere and vice versa - in the specified quantity, at all times. With this conical rotary valve even large volumes are easy to control. Long service times are guaranteed, as TroMaxx® compensates automatically for wear as it works.

The series includes models with impeller vane capacities from 6 to 1000 liters.

TroMaxx® - your bridge between pressurized chamber and the atmosphere.

APPLICATIONS

- Sugar Industry
- Oil Mill Industry
- Chemical Industry
- Foodstuffs Industry
- Cellulose Industry
- Construction Industry
- Power Plant Installation
- Underground Construction and Mining
Karl Hamacher GmbH had developed different pneumatic conveying concepts, utilising pressurised air for handling a wide variety of solids. Our equipment is designed and scaled according to the required capacity and transportation distance of each field.

Backfill is one of the methods in which our technology has been increasingly used by mine operators.

For more information please contact our agents below:

BBN – Mining GmbH
Birkenweg 28
66265, Hausweiler
Germany
Phone: +49 6806 9873 16-0
E-mail: sts@bbn-mining.com

CT Grup Maden Ekipmanları Ltd. Şti.
Çayırhan Mahallesi
Ergün Fazıl Paşal Caddesi No: 39
Nallihan - ANKARA
Phone: +90 312 796 26 50
E-mail: mehmet.yoruk@ctme.com.tr
AUTOMATION

Swedish Exergy AB through its subsidiary Exergy Dryers Pvt. Ltd. provides high quality automation solutions for various industry segments on a world-wide basis.

OUR FOCUS PLATFORMS:

<table>
<thead>
<tr>
<th>PLC</th>
<th>HMI/SCADA</th>
<th>DCS</th>
<th>MES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Siemens S7/CT/M7 series</td>
<td>Wonderware Intouch/System Platforms</td>
<td>Siemens PCS7</td>
<td>Simatic IT MES</td>
</tr>
<tr>
<td>Allen Bradley Compact Logic, SLC</td>
<td>Siemens WinCC/WinCC Flexi</td>
<td>Emerson Ovation/Delta V</td>
<td>Wonderware MES</td>
</tr>
<tr>
<td>Delta Electronics</td>
<td>Allen Bradley RS View/FT View</td>
<td>ABB Freelances/Advant OCS</td>
<td></td>
</tr>
<tr>
<td>Micro PLCs</td>
<td></td>
<td>Yokogawa Centrum</td>
<td></td>
</tr>
<tr>
<td>Motion Controllers</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

OUR SERVICES:

**DESIGN & ENGINEERING**

- Electrical single line diagram
- Electrical wiring diagram (Auto CAD electrical/Eplan electrI P8 /ELProCAI)
- Control panel design
- Technical content writing
- Documentation

**PROJECT EXECUTION & SUPPORT**

- Automation consultation
- System integration (PLC/DCS/VFD/Servo/Soft Starter/ProfiBus/Modbus/Device Net/CAN bus/Industrial Ethernet)
- PLC/DCS/SCADA Design
- PLC/DCS/SCADA/Motion Controller Programming
- Process/building/Machine Automation
- 24 x 7 Support

**PANEL MANUFACTURING, SITE INSTALLATION AND COMMISSIONING**

- Electrical control panel manufacturing – LT/HT / Power Factor Controller
- Electrical Panel Wiring
- Project site support including Installation and Commissioning
- Skilled manpower out sourcing service

**DEVELOPMENT AND TRAINING**

- Automation project development
- Manpower training & skill development
- Training in PLC programming (Siemens, Allen Bradley, Delta)
- Training in SCADA
- Training in AutoCAD electrical, Eplan Electric P8, ELProCAI)
- Training in VFD
- Training in industrial process communication in Profibus/Modbus/CAN Open/Industrial Ethernet
SELECTED CLIENTS

- Exergy Hamacher GmbH, Germany
- Biowood (Hafslund), Norway
- Confidential Client, Switzerland
- Sedamyl S.p.A, Italy
- LG Hauys, Korea
- Rockhammer Bruk, Sweden
- BPP, Denmark
- Swedish Exergy AB, Sweden
HEAD OFFICE
Swedish Exergy AB
Gamla Rambergsvägen 34
SE-417 01, Gothenburg
Sweden

Phone: +46 (0) 31 51 39 90
Fax: +46 (0) 31 51 79 60
E-Mail: info@swedishexergy.com
www.swedishexergy.com

EXERGY DRYERS PVT LTD.
G-104, Site-B, Surajpur Industrial Area,
Surajpur, Greater Noida
Disstt. Gautambuddh Nagar
Pin – 201306 (U.P.), India

Phone: +91 120 256 1125
Fax: +91 120 431 0184
E-Mail: info@swedishexergy.in

EXERGY HAMACHER WORKSHOP
Village - Nangal Uperla,
Tehsil - Nalagarh, District - Solan
Pin Code - 174101 Himachal Pradesh
India

Phone: +91 9805056674
E-Mail: anil.kumar@swedishexergy.in