ACTING ECONOMICALLY — GROWING SUSTAINABLY

The ecoplants solutions from SMS
“We were able to up production, cut costs thanks to energy-efficient processes, and do something for the environment at the same time.”

Tim Hsu
Tung Ho Steel, Taiwan
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The challenge of reconciling sustainability and economic growth must be addressed in practically all the world’s markets. It is also playing an increasingly important role in the metal industry due to the latter’s comparatively great potential for saving energy. In response to this development, SMS is offering its customers solutions that focus equally on both areas.

Ecoplants is our new mark for sustainable solutions, in recognition to the fact that sustainability has become a key growth factor for our customers — for economic and ecological reasons. Economic because saving energy and raw materials reduces costs, and ecological because protecting resources is becoming increasingly important. Ecoplants solutions do both.

The idea for ecoplants did not just appear overnight. Engineers at SMS have long been redesigning processes to boost energy efficiency or reduce emissions. Ecoplants provides these efforts with a framework, a set of rules — and makes them a top priority when it comes to the future development of innovations. In all of our product units, we systematically examine how we can continually improve the sustainability of the solutions we offer.

This is not a declaration of intent, it’s a living reality. This brochure contains demonstrative case studies of ecoplants solutions which are already in operation and are providing customers of SMS with a wide range of advantages. This is added value that we can quantify by comparing it to the respective standard technology. Ecoplants has already started having an effect — sustainably and profitably.
Comparability and the ability to present things objectively are two decisive preconditions for demonstrating sustainability. That’s why we have defined factors that can be used to measure the added value of ecoplants solutions — as a rule in direct comparison to the predecessor technology.
When a technology is proposed as an ecoplants solution, the responsible engineers conduct a sustainability check. The ecoplants criteria are the following four dimensions:

- Significant reduction in the use of raw materials
- Significant reduction in the use of energy and operating media
- Significant reduction in emissions
- Significant improvement in the recycling quota

The conditions are checked on a reference plant. If they are met, we evaluate the product in question and the associated reference plant as an ecoplants solution. Subject, of course, to one further, decisive criterion being fulfilled: That our customers gain an economic added value from the new solution.
All SMS product units develop solutions deserving the ecoplants mark. Ten of them are already being used by our customers. We present them on the following pages, whenever possible with practical references to the advantages of their business and the environment. This brochure shows the status in 2012.

For the most current references, visit ecoplants on the internet:

www.sms-ecoplants.com
CMT™ MINIMILL
Pioneering energy efficiency

CMT™ (Continuous Mill Technology) takes the basic minimill concept a step further: Short paths are ensured by linking the rolling mill directly to the steel works. Unlike conventional plants, CMT™ does not require heating furnaces. Instead, the rolling is carried out directly using the casting heat. The temperature profile can be flexibly adjusted using an inductive heating system. The investment costs for this inductive heating system are significantly lower than those for conventional furnace concepts. The bottom line is that CMT™ is an innovation that pays off — in more ways than one.

The first CMT™ reference plant is the Tung Ho Steel minimill in Taoyan/Taiwan. SMS Meer was commissioned to build a rebar mill with an annual capacity of 800,000 tons. Other requirements were that the mill should have the lowest possible energy consumption and minimal emission values. We developed the CMT™ technology as our answer to this challenge.

Ecoplants criteria

Ecological benefit:
Emissions savings:
72,000 t CO₂ p.a.
410 t SO₂ p.a.
225 t NOₓ p.a.

Economic benefit:
Cost reduction: 11 €/t
THE CUSTOMER’S VIEW

“The new minimill from SMS Meer fulfils our requirements: We were able to up production, cut costs thanks to energy-efficient processes, and do something for the environment at the same time. So we not only save on emissions, but also hard cash.”

Tim Hsu
Tung Ho Steel, Taiwan
MEERDRIVE®
Revolution in wire rod production

The basic idea of the MEERdrive® is to replace the heavy gearboxes of a rod mill block by intelligent individual drives for each stand! A new type of high-speed controller matches the individual drives perfectly to one another, making it possible to achieve the roll speeds necessary for the process with extreme precision.

The MEERdrive® concept simplifies replacement part management, creates flexibility in pass schedule planning and minimises maintenance costs. The precise control of the process enables the metallurgical properties of the end product to be exactly determined. Roll wear falls considerably, as does energy consumption, because the individual motors operate much more efficiently than a group drive.

Several customers have started to use MEERdrive® technology for wire rod production — one of the fastest, most energy efficient and quietest worldwide.

Ecoplants criteria

Ecological benefit:
Energy consumption:
1,800 MWh p.a. less

Economic benefit:
Cost reduction:
60% lower rolling ring requirements
PQF® (Premium Quality Finishing) is characterised by the outstanding quality in the production of precision thin-walled tubes. The technology is based on the 3-roll concept, individual roll drive, and hydraulic screwdowns. As a result, the roll gap can be precisely set and adjusted within fractions of a second. The bottom line is a significant reduction in material and energy consumption — and in turn, reduced production costs.

For example: SMS Meer has set up a PQF® plant for manufacturing seamless tubes in Jeceaba, in the south-eastern state of Minas Gerais, on behalf of Vallourec & Sumitomo Tubos do Brasil (VSB). VSB set great store on an environmentally friendly process chain. And the PQF® plant makes a valuable contribution to this objective. Tool wear is comparatively low, and the reduced reheating saves energy.

**THE CUSTOMER’S VIEW**

“*The SMS companies are extremely reliable partners. We have found the best possible supplier for our high quality and sustainability requirements. Our partners from SMS also worked closely with us throughout the construction of the plant. That’s what I expect from a genuine cooperation.*”

**Christiano Caldeira**
Vallourec & Sumitomo Tubos do Brasil, Brazil

**Ecoplants criteria**

**Ecological benefit:**
- Efficiency: 5% higher
- Energy consumption: 10% lower
- Tool use: 2% lower

**Economic benefit:**
Cost reduction: 26 €/t
CONTIROD® COPPER ROD PRODUCTION
Top quality, highly efficient

CONTIROD®, a reliable technology for casting and rolling of copper rod for 40 years, was re-engineered by SMS Meer for even more energy efficiency. A newly-shaped melting furnace achieves a far more efficient heat transfer from the combustion gas to the raw material. Furthermore we added an automatic combustion control system. The result is also a minimisation of liquid copper oxidation and a reduction of gas consumption through optimised combustion conditions.

By using frequency-controlled AC drives for the melting furnace fan as well as for the rolling mill frames, the consumption of electricity was also remarkably reduced.

The Chinese copper wire rod manufacturer Eastern Copper has already put the optimised CONTIROD® process into operation. The new plant consists of a shaft-type melting furnace followed by a 20 t holding furnace. For the highest wire rod qualities, the CONTIROD® line works with a Hazelett twin-belt caster and a continuous SMS Meer rolling mill. Its 14 roll stands have individual drives and the latest electrical systems for optimum process control.

Ecoplants criteria

Ecological benefits:
- Savings potential*: approx. 27% in fuel consumption
- Savings potential*: approx. 67% in electricity consumption

Economic benefit:
- Savings potential*: approx. 4 €/t

* compared with the predecessor technology
In the future, light-alloy extrusion presses from SMS Meer will operate even more efficiently than to date. The reason is an automatic starting and stopping of the drives which significantly reduces energy consumption.

During hydraulic extrusion of light alloys, for example aluminium, the force is transmitted to the material by means of pump drives. Not all the drives are required during each extrusion cycle. If a pump is idling, it is automatically switched off by the new process — and then switched on again automatically when power is required. The resulting savings potentials are quite significant: With 6,000 production hours per year and an average pump load, the energy consumption can be reduced by 50,000 kWh per drive.

This results in an economic benefit of 4 Euros per tonne of produced profiles — a great competitive advantage.

**Ecoplants criteria**

**Ecological benefit:**
- Energy savings: 50,000 kWh per drive p. a.

**Economic benefit:**
- Cost reduction: 4 €/t

**THE CUSTOMER’S VIEW**

“Our new 55 MN extrusion press from SMS Meer is equipped with a soft starter drive. This technology is worth its money: Single motors can be stopped when there is no need for full power. That’s why the soft starter drive got the ecoplants mark for a more sustainable production combined with higher cost-effectiveness.”

**Dietmar Ebel**

OTTO FUCHS, Germany
ENERGY RECOVERY DURING MELTING PROCESSES
Intelligent use of hot exhaust air

In nearly all metallurgical melting units, e.g. electric arc furnaces, hot exhaust gases are produced which, in most cases, remain unused. Up to 40 percent of the energy expended exit from the furnaces together with the hot off-gas. In order to minimize these losses, SMS Siemag offers tailor-made energy recovery systems. In the plant of the Turkish ferrochrome producer ETI KROM for example, the energy from the exhaust gas produced at two submerged arc furnaces with a temperature of approx. 600°C will be converted into superheated steam in future. It will be used to drive a steam turbine which generates 5 MW of electrical energy. In this way, our customer reduces the emissions of CO₂ and saves electricity amounting to a total value of up to 3.5 million Euros per year.

From the middle of 2013, the Chinese steel producer Fujian Fuxin Special Steel will be working with energy recovery systems from SMS Siemag for an electric arc furnace and an AOD converter. The systems convert the exhaust gases with a temperature of above 2,000°C into saturated steam. This steam is fed into the plant network and is used for cooling electrical units for example.

THE CUSTOMER’S VIEW
“We do not see any contradiction between ecology and economy. We have therefore decided in favour of the energy recovery system from SMS Siemag for the electric arc furnace and the AOD converter. SMS Siemag has put together for us the optimum package for combining ecology and economy.”

Tzuo-Ying Mei
Fujian Fuxin Special Steel, P. R. China
LAMINAR COOLING SYSTEM FOR HOT STRIP MILLS
Sustainable down to the smallest detail

As a supplier of integrated plants, SMS Siemag offers a broad range of fresh water and waste water systems for all kinds of metallurgical plants, rolling mills and strip processing lines, on the basis of which we develop tailor-made solutions for our customers. As regards sustainability, they fulfill even the highest demands: our plants achieve recycling rates of up to 99.8%.

The latest example is a resource-saving solution for our Swedish customer Svenskt Stål (SSAB). Here, SMS Siemag has upgraded the customer’s hot strip mill with a new laminar cooling system. To ensure sufficient water supply for the cooling system, an entirely new water supply and treatment system has been installed at the same time, which sustainably reduces both costs and environmental pollution.

Cooling of the process water does not take place in cooling towers, as otherwise usual, but in heat exchangers that use river water as cooling fluid. Therefore, the amount of water lost due to evaporation and blow-down systems in the laminar circulation system is reduced by approx. one million m³ per year. As a consequence, also the expensive make-up water treatment is no longer required for this considerable amount of water. In the process, the river water is heated up, but not contaminated.

Thanks to speed-controlled motors, the pumps of the laminar circulation system are always operated at their respective optimum operating conditions. In connection with the water savings mentioned above, this results in energy savings of approx. 2,500 MWh.

Pipes and tubes, filter tanks and other components that are in contact with water are made of stainless steel in order to avoid corrosion or the use of additional chemicals. Sintering particles, oils, greases and other floating substances are removed in a sedimentation basin.

Ecoplants criteria

Ecological benefits:
Savings:
1 million m³ of water saved p.a.
2,500 MWh of energy saved p.a.

Economic benefits:
Electricity cost savings:
up to 180,000 €p.a.
“Compared to operation with our previous cooling section, we are now in the position to produce hot strip for heavy-duty vehicles with a higher cargo capacity and better resistance to wear thanks to the new laminar cooling system. The results for our customers are lower costs and a reduced environmental pollution.”

Börje Sundell
Svenskt Stål, Sweden
During the melting process, a quantity of up to 20 kilograms of dust per ton of steel are generated which must be removed via the exhaust air. Cleaning of the exhaust air is necessary to ensure a sustainable steel production and is governed by numerous regulations. Hydro hybrid filter systems from SMS Siemag ensure that these regulations are met and offer considerable economic advantages.

SMS Siemag is retrofitting six existing converters with hydro hybrid filter systems in the works of ArcelorMittal Kryvyi Rih in the Ukraine. For this purpose, the existing BOF wet dedusting systems are additionally equipped with wet electrostatic precipitators. By means of this procedure, the investment costs and the costs for production downtimes are considerably reduced as compared with the new installation of a conventional dry dedusting system.

Moreover, the hydro hybrid filter system operates much more efficiently: The electricity costs saved by our customer amount to approx. one million Euros per year. The innovative process also speaks for itself from an ecological point of view: We guarantee clean-gas dust contents with values of below 10 milligrams per standard cubic metre of converter gas. In this way, the retrofitted plant even meets the most stringent restrictions placed on exhaust air cleaning.

**Ecological benefits:**
- Reduced emissions:
  - Dust: < 10 mg/Nm³
  - CO₂: approx. 6,500 t p.a.*

**Economic benefits:**
- Electricity cost savings:
  - up to €1 million p.a.

* Potential for reduction of CO₂ emissions, calculated with grid factor Germany
AIRWASH™ EXHAUST AIR PURIFICATION SYSTEM
Rolling oil recycling that pays off

In the process of cold rolling aluminium and special steel strips, oil-laden exhaust air is generated. For cleaning the exhaust air, SMS Siemag has developed the Airwash™ exhaust air purification system. From an economic point of view, the Airwash™ system is clearly superior to common fume exhaust systems, since rolling oil is recovered from the exhaust air flow that can be completely re-used in the rolling process.

Airwash™ has already convinced 21 major customers worldwide. One of these customers is the Chinese Yunnan Aluminium, for which SMS Siemag installed an aluminium cold rolling plant in 2010. The integrated Airwash™ system achieves an exhaust volume of 120,000 m³/h and fulfills the high demands as regards environmental protection. The results: clean air, recovered rolling oil for the rolling process and treated washing oil for repeated cleaning of the exhaust air. Thanks to state-of-the-art filter systems, between 150 and 300 kg rolling oil per hour can be filtered from the exhaust air, depending on the respective plant.

Airwash™ pays off not only for new plants, but also for existing rolling mills, which can be upgraded with this technology without any problems. Experience shows that the investment for an Airwash™ exhaust air purification system already pays off after a few years.

**Ecoplants criteria**

- **Eco benefits:**
  - Reduction of oil consumption: up to 2,500 t p.a.
  - Economic benefits:
    - Cost reduction: up to €2 million p.a.
The new SMS Siemag electric arc furnace will be a revolution in steelmaking. Thanks to a degree of continuity in the production process that was technically impossible to achieve up to now, productivity is increased by 30%, while energy consumption is drastically reduced.

All components of the ARCESS® S/EAF® (steady electric arc furnace) are designed for nonstop operation of approx. one week. In the melting process, systems are used that SMS Siemag had originally developed for submerged arc furnaces. The S/EAF® is continuously charged; the level of slag is controlled by a new, patented slag door system. Thanks to the closed-type design of the furnace, noise and dust emissions are reduced. The steel is tapped slag-free and also with the power on. As a result, energy consumption and thus production costs and environmental pollution are reduced drastically. In an example scenario for operation with 100% hot DRI, the specific electrical energy consumption is reduced by 20 kWh/t.

The integrated energy recovery system even further reduces energy consumption: The hot exhaust gas is extracted directly at the furnace, treated in the gas cleaning system and used for the generation of superheated steam, which can be utilized for a variety of applications. Thanks to its continuity, the S/EAF® process is ideally suited for this purpose. In the above mentioned example 100 kWh/t steel can be generated with the steam and therefore saved additionally.

### Ecoplants criteria

**Ecological benefits:**
- Energy recovered: approx. 120 kWh per ton of steel
- Emissions saved: approx. 80 kg CO₂ per ton of steel

**Economic benefits:**
- Increase in productivity: 30%
- Savings: approx. €8 per ton of steel*

* Calculation based on the electricity prices in Germany, excl. the value of the CO₂ certificates.

### THE EXPERT’S VIEW

“Continuous operation in electric arc furnaces is only made possible by the electrode slipping device, which represents proven technology of long standing in these furnaces. Making use of this principle in the new S/EAF® represents true innovation and will certainly provide for a significant increase in efficiency.”

**Prof. Dr. h. c. B. Friedrich**
IME Institute for Process Metallurgy and Metal Recycling
Institute and chair at the RWTH Aachen, Germany
SMS GROUP
Leaders in plant construction and mechanical engineering

The SMS group is, under the roof of SMS Holding GmbH, a group of global players in plant construction and mechanical engineering for the steel and nonferrous metals processing industry. It consists of the two Business Areas SMS Siemag and SMS Meer. The two Business Areas operate as independent group companies that cooperate closely with each other. As the financial organization, SMS Holding GmbH is responsible for strategic planning and controlling. The sole owner of the SMS group is Siemag Weiss GmbH & Co. KG, the holding of the Weiss entrepreneurial family.

FAMILY-OWNED AND WORLDWIDE PRESENT
As a family-owned company, the SMS group has built on solid values and a culture of responsibility for four generations. It holds a strong market position while its decentralized structure ensures a fast and efficient response to individual customer demands. The SMS group combines the flexibility of company units that operate as medium-sized enterprises and the broad resources of an internationally active company – all for the customer’s benefit. The decentralized corporate culture ensures that not only the individual units but also the employees themselves always think and act in an entrepreneurial manner.

BUILDING ON A STRONG BASIS
A long-term view, careful financial management, focus on values, plus knowledge about the cycles of the machine and plant construction market have, for decades, informed the group’s strategic planning. Also high on the agenda is investment in the areas of energy and environment technology, service and modernization of plants as well as on-the-job training and qualification of core employees. On this basis, the SMS group creates tailor-made plant solutions, which enable the customers to keep well ahead of the competition.
The information provided in this brochure contains a general description of the performance characteristics of the products concerned. The actual products may not always have these characteristics as described and, in particular, they may change as a result of further developments of the products. The provision of this information is not intended to have and will not have legal effect. An obligation to deliver products having particular characteristics will only exist if expressly agreed in the terms of the contract.