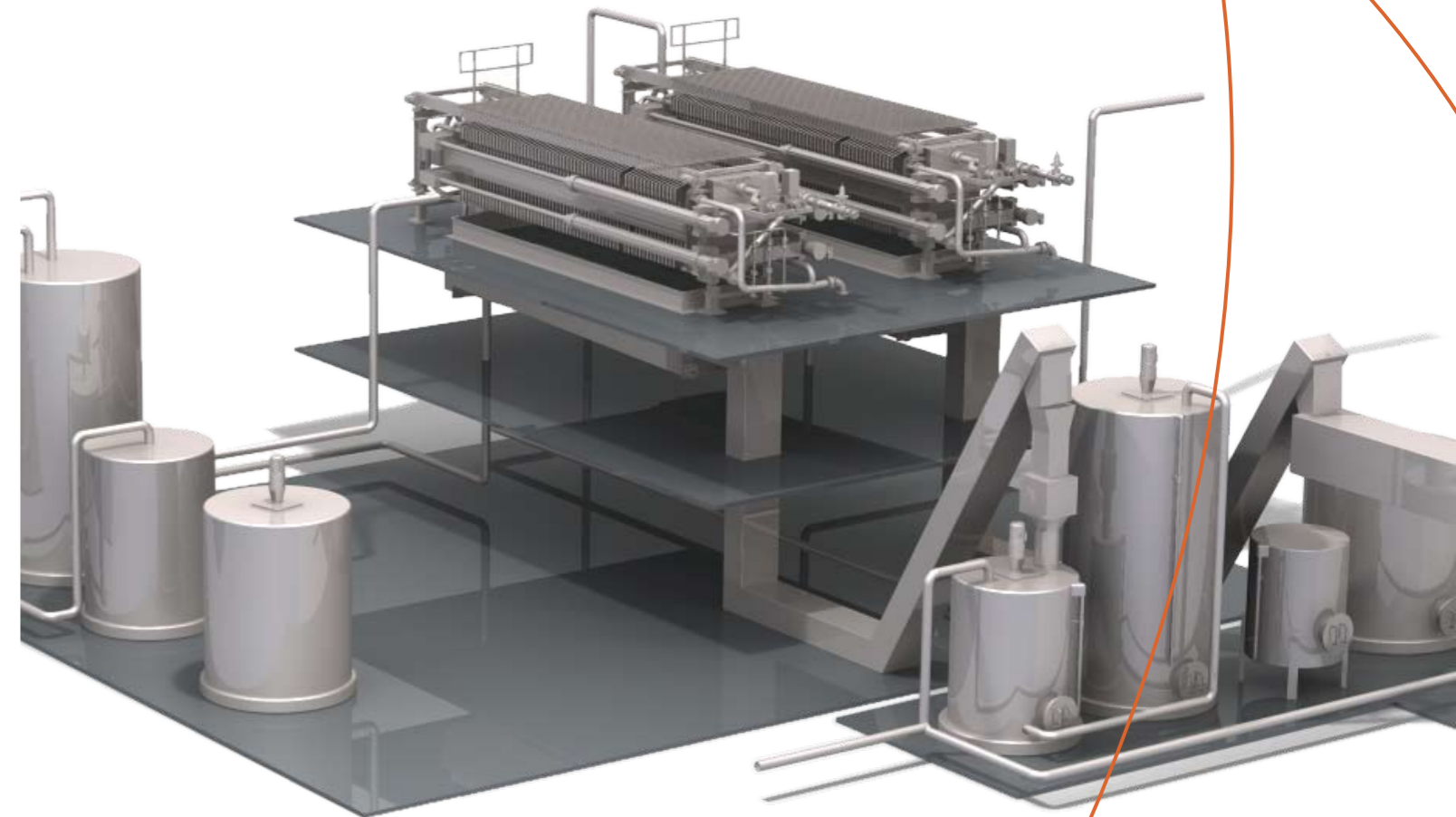
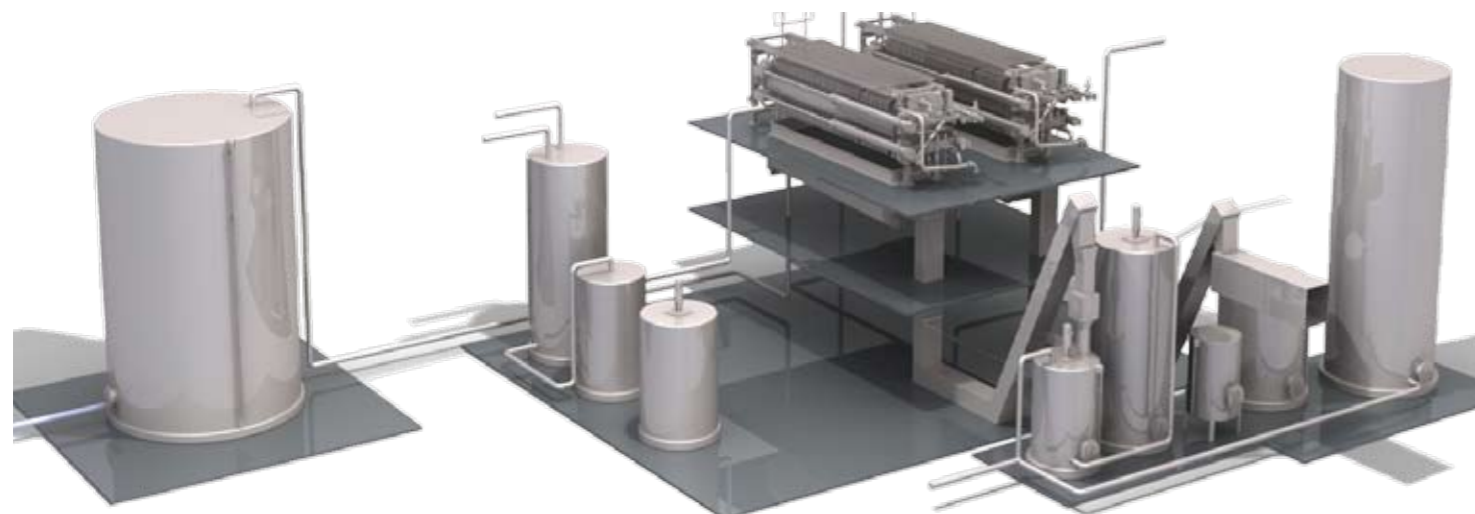
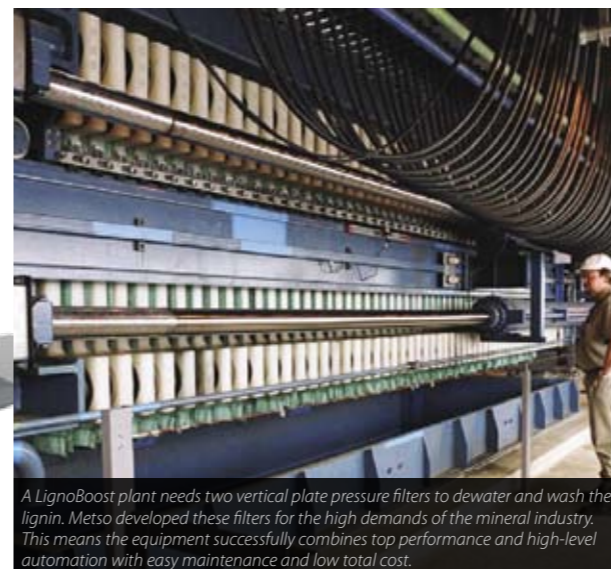


Lignin from black liquor
LignoBoost





LignoBoost is a standardized, compact concept with a standalone plant that can be erected without interfering with normal production.



A LignoBoost plant needs two vertical plate pressure filters to dewater and wash the lignin. Metso developed these filters for the high demands of the mineral industry. This means the equipment successfully combines top performance and high-level automation with easy maintenance and low total cost.



Nordic Paper - Bäckhammar, Sweden. Plant data:
 • 175 000 ton SW pulp
 • Kappa number 40
 • BL solids about 70%
 • 690-700 ton DS/day
 • 6 000 - 10 000 ton lignin/year
 • Lignin DS: 70 %

New process extracts lignin from pulp mill black liquor

LignoBoost

LignoBoost makes it possible to increase the liquor-burning capacity of chemical recovery boilers and to extract the wood component lignin from the black liquor. Lignin can be used to replace fossil fuel, or as a raw material in the chemical industry. LignoBoost gives pulp mills new potential to increase production, reduce costs and create new sources of income.

Higher production, greater savings and new sources of income

LignoBoost is a complete system that extracts lignin, a component of wood, from Kraft black liquor. The results are lignin-lean black liquor that is returned to the pulping process, and virtually pure lignin for numerous profitable applications.

Increased pulp production

The chemical recovery boiler of a Kraft pulp mill is its single largest investment and, ironically, often a bottleneck in production – you can only push so much black liquor through

it. By removing 25% of the lignin in the black liquor, the boiler capacity can be increased to allow 20-25% more pulp production.

Lower fossil fuel consumption

Lignin is an outstanding biofuel with high heat value. It can be used on site, for instance in a bark boiler, in a power boiler or to replace fossil fuel in a lime kiln. Lignin is easily dewatered to 70% DS and the amount of energy required to dry lignin is less than 20% of the amount required for the drying of forest fuel. Potential savings made by using lignin in a lime kiln are as much as 50 liters (13 gallons) of fuel oil per ton of pulp. For a mill with an annual production of 200 000 metric tons of pulp the savings potential is 10 000 m³ (2.6 million gallons) of oil.

New sources of income

Green energy produced from lignin can be profitably exported as process steam or power, or simply sold as fuel in the form of pellets or powder. Lignin is also a good candidate for making specialty chemicals. This makes it a very interesting substance for the chemical industry where many companies are looking for renewable raw materials for the production of chemicals. In addition, there have been successful trials at making carbon fibers from lignin. Both exporting

lignin as fuel and selling it for further refining give pulp mills opportunities for new sources of income.

Firing lignin in the lime kiln may, depending on the situation in the mill, save up to 50 litres (13 gallons) of fuel oil per ton pulp. For a mill with a yearly production of 200 000 metric tons of pulp, the yearly saving is 10 000 m³ (2.6 million gallons) of oil.

A well-spent decade of R&D

A joint project started in 1996 by Innventia (former STFI-Packforsk) and Chalmers University of Technology made major advances and, in 2003, the design principles of LignoBoost were verified. Mill pilot-scale trials led to a demonstration plant in 2007 that now produces pure lignin used as fuel on a large scale. Already supplying key components and recognizing its massive potential, Metso purchased the LignoBoost technology in its entirety in an agreement with Innventia that includes further development, design tool improvement and industrial up-scaling.

Industrial-size demonstration plant

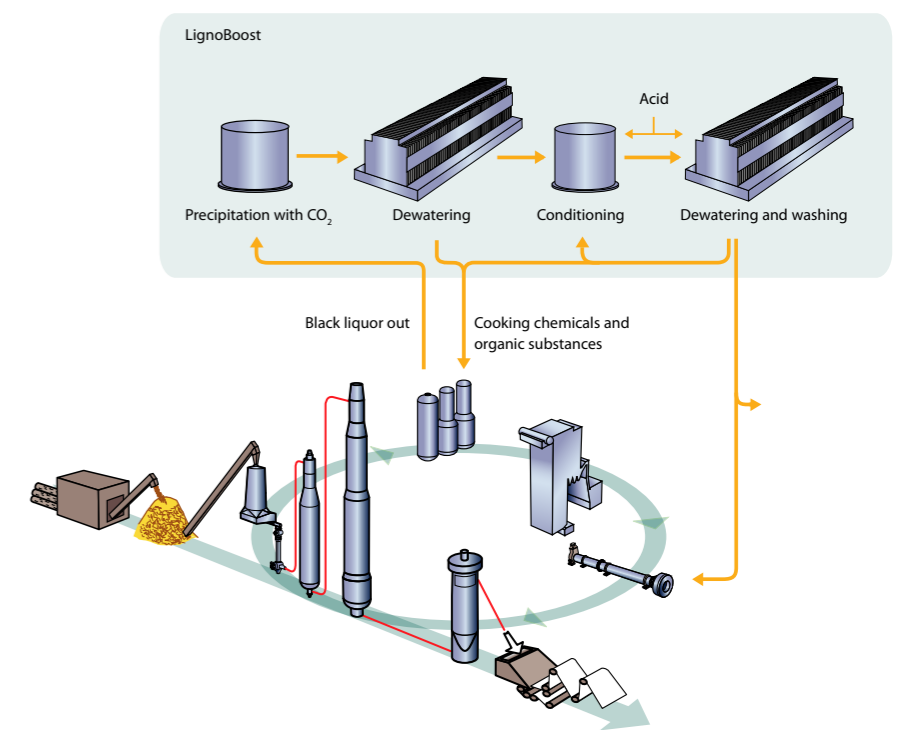
The demonstration plant (capacity: 6 000-10 000 metric ton lignin/year) is integrated into the pulping process of Nordic Paper - Bäckhammar, Kristinehamn, Sweden. The demonstration plant can be used for test runs on liquors from any mill and also for further research and development of Lignin extraction and refining technology.

Tomorrow

New processes for production of biofuel for motor vehicles are under development where lignin is a good candidate as raw material, particularly since it can be extracted in large quantities. But above all, there is vast potential in the chemical industry in the form of, for example, the main ingredient in phenols, carbon fibre composites (also a fossil fuel saver as cost-reduced composites could be used e.g. in the automotive industry to reduce vehicle weight), binders, soil improvers, active carbon and much more. LignoBoost represents a major advancement in the struggle to turn pulp mills into true bio-refineries, and lignin has gained considerable interest in the market as a valuable environmentally-beneficial asset with a rapidly growing number of applications.



Lignin storage at the Bäckhammar mill (70 % DS)
 Heating value (lignin fuel, typical): 25-27 MJ/kg
 Lignin content (lignin fuel, typical): 92-98 %



LignoBoost works in conjunction with evaporation. It all starts with lignin being precipitated from the black liquor by lowering the pH with CO₂. The precipitate is the dewatered using a filter press. LignoBoost then overcomes conventional filtering and sodium separation problems by redissolving the lignin in spent wash water and acid. The resulting slurry is once again dewatered and washed, with acidified wash water, to produce virtually pure lignin cakes. The lignin can be exported or, after final drying, used as fuel in the lime kiln.