ESI Eurosilo® BV

ULTIMATE STORAGE SOLUTIONS FOR BULK SOLIDS

A history in future proof solutions

ESI Eurosilo head office

ESI Eurosilo, today's expert in bulk material storage

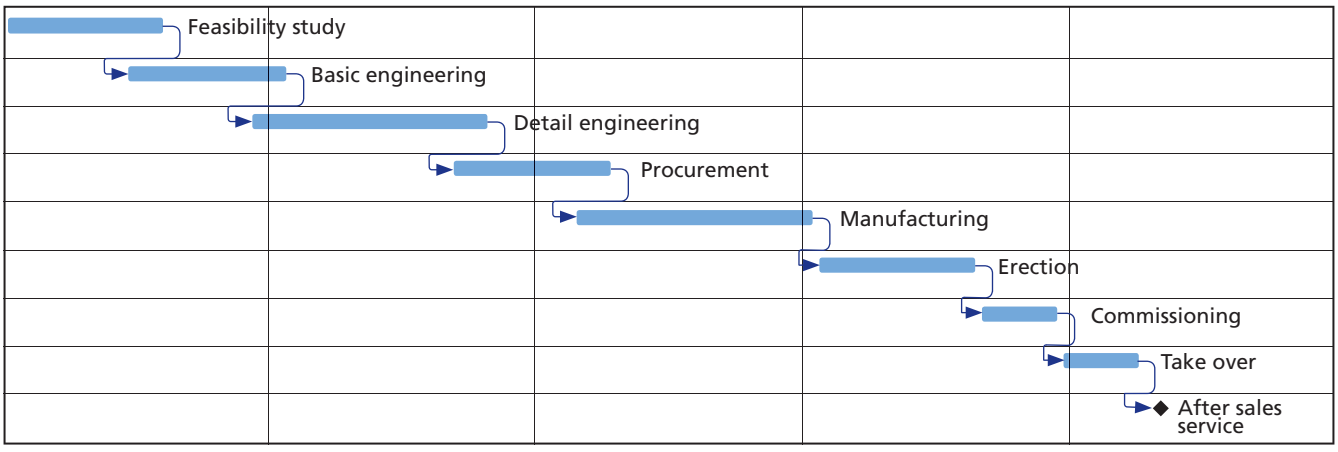
With a history of over 40 years and a track record of more than 120 units built around the world, ESI Eurosilo is the leading engineering & contracting company in storing non free-flowing bulk solids. Throughout the years, we have gained in-depth knowledge of the challenges that our customers in various industries are faced with. What started in the late 1960's as a storage facility for a Dutch potato starch manufacturer, developed into an advanced solution for the power and chemical industry as well. Our aim is to deliver technology that will help you meet economical, environmental and physical demands in the best way possible. Enclosed storage in fully equipped mammoth silos will do just that.

From feasibility to turnkey delivery

As an engineering company and a contractor, ESI Eurosilo can support ventures from the first stages - exploring requirements, limitations and options - up to turnkey delivery. This end-to-end approach provides you with a single partner to control the complete process. Being an independent company, we are not bound by specific manufacturers or suppliers, so we can accommodate any preferences for local parties to a large extent.

Tailor made support to large engineering projects

- Feasibility study
- Basic engineering
- Detail engineering
- Procurement
- Manufacturing
- Erection
- Commissioning
- Take over
- After sales service



Typical project approach

1967: 3 x 20,000 m³ potato starch

1981: 11,000 m³ coal silo

Our company values

ESI Eurosilo offers state-of-the-art engineering expertise and decades of experience. But our core values really make it work. They have brought us to where we have come today, and we will maintain them for a successful future. Working with us, you will find a dedicated partner that is keen on being:

- Goal-driven throughout the complete organisation
- Flexible in solving tie ups and changes
- Responsive to requests
- Directly accessible
- Proactive and passionate

Compliant to industry standards

Our company is ISO 9001 and OHSAS 18001 certified and our storage solutions are compliant to ATEX and NFPA standards.

2 x 100,000 m³ coal silos under construction

Sustaining coal fired power stations

FGD Gypsum silo dewatering storage load-out

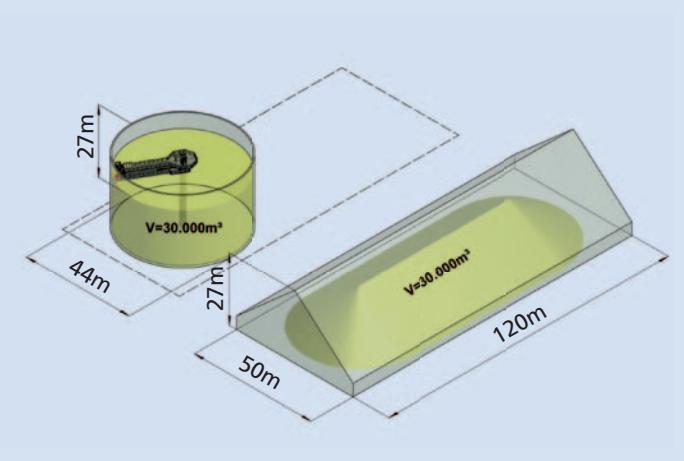
Future proof solutions

With the limited economic perspective of alternative energy and the hesitance to nuclear power, we believe that coal based power generation will maintain it's prominent position for years to come. The growing demand for energy of today's society is however rivalled by the growing environmental concern and the subsequent legislation. ESI Eurosilo supports customers worldwide to make these ends meet. A range of proven solutions is designed to significantly improve overall cost efficiency, while enhancing sustainability, safety and productivity.

Storage with a minimal carbon footprint

As many other resources, space is often a restraint for expansion. Open-air storage of coal also adds costly environmental drawbacks to that, as well as loss of energetic value. Enclosed storage in highly automated silos solves all these problems at the smallest possible footprint. The Eurosilo® system offers storage capacities of up to 100,000 m³ so far. The coal is fed from the top of the silo into a telescopic chute through which it reaches the auger frame on the coal surface. Two main parallel screw conveyors distribute the material over the entire area of

the silo, layer by layer, while the auger frame rotates. Reclaiming is done by withdrawing coal from the bottom and by inducing central gravity flow. The screw conveyors than rotate in reverse to feed coal into the formed core-flow.



Minimal footprint

Fuel Management to maximize revenue

Most power plants can only operate at the highest efficiency rate by burning a designated coal blend. To prepare the right blends at the right time, our Fuel Management System can be of great help. This software visualizes the different grades of coal in multiple silos and enables the operators to plan the coal blending in the optimal way. The boiler specifications and the coal characteristics are the input data of the Fuel Management System as well as the actual storage levels. By reclaiming the respective coal grades from each silo in a controlled and adjustable rate, the optimal coal blend can be prepared.

FGD Gypsum storage made easy

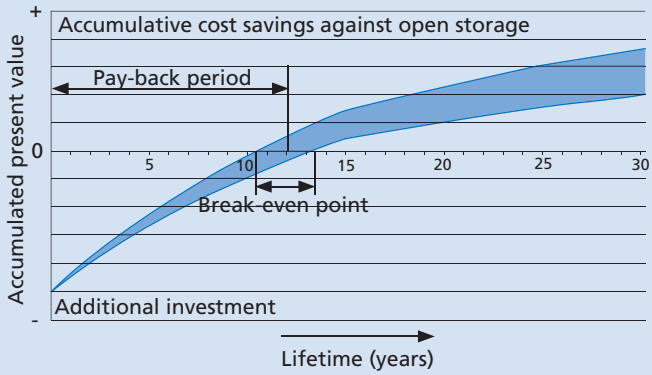
The Eurosilo® system offers a reliable system for storing non-free flowing bulk materials such as FGD Gypsum, fly ash, limestone or biomass. In order to eliminate block ups caused by the poor flow properties of these materials, a slotted central column was designed for uncomplicated reclaiming. The material is fed through the slots formed by the horizontal flat rings, and descends freely down the column. The FGD Gypsum silos are also equipped with a drainage system on the bottom to avoid a sticky layer in the lower regions of the silo. In addition to that, we developed a system that creates under-pressure in the dewatering system. Since the 1980's more than 50 FGD gypsum silos have been installed at numerous power stations around the world.

Key features of the Eurosilo® system

- No pollution or loss of calorific value
- Minimal footprint for large scale storage
- Safest storage method in the market
- Maximum logistic control and flexibility
- Minimal operating and maintenance costs
- High availability due to minimal downtime

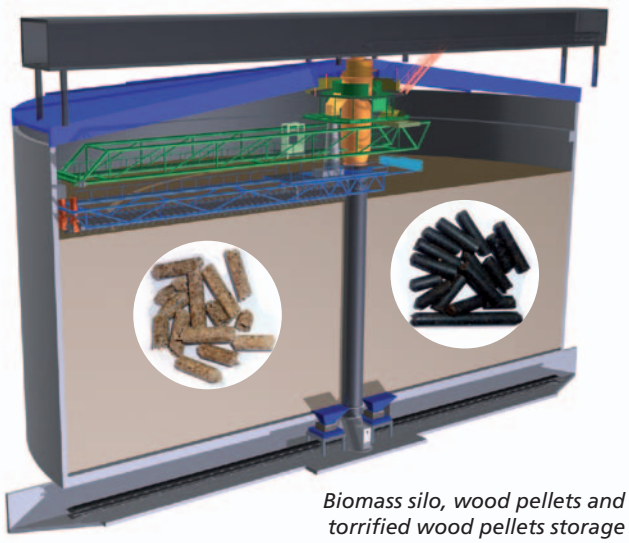
Lifecycle assessment

To ensure long-term competitiveness, it is vital to achieve cost-effective compliance with environmental regulations and self-imposed policies. Environmental Management Accounting (EMA) integrates environmental, operational and maintenance issues into the financial analysis. An integrated lifecycle assessment, as recognized by the



Pay-back period

European Community, offers a complete evaluation. Following this approach, the investment in Eurosilo® systems comes with a payback period of just 10 to 15 years.



Biomass silo, wood pellets and torrified wood pellets storage

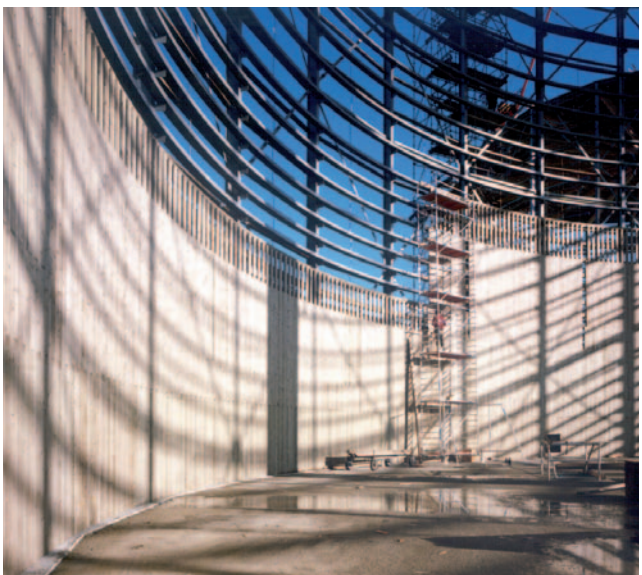
Conserving basic chemicals and minerals

Protective storage

The Eurosilo® system offers great advantages to the specific demands of chemical process-plants. To enable an uninterrupted production process, the availability of raw materials is crucial. Therefore storage of basic chemicals is necessary to compensate supply chain irregularities. Besides storage and output in any required quantity, this also requires suitable storage conditions, as these materials can be corrosive, hygroscopic or cohesive. Enclosed storage in silos offers a controlled environment inside and a well-protected environment outside. Considering the environmental concerns and governmental regulations, proper storage of these health hazardous materials is indispensable. ESI Eurosilo can tailor storage solutions to your needs.

Reliable logistic solution

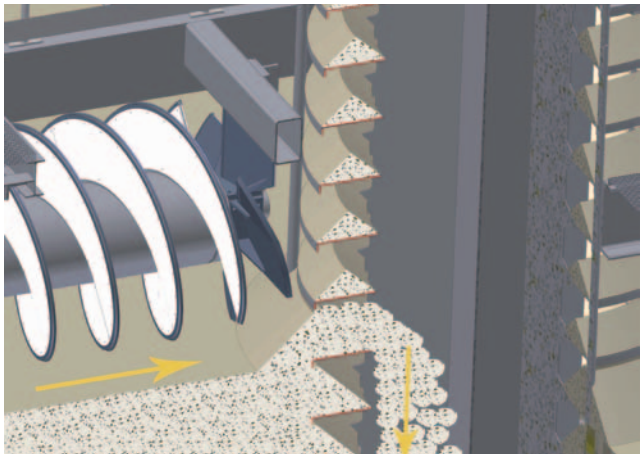
The main application for the Eurosilo in the chemical and minerals industry concerns storage at the plant or mine site, between production and train, truck or ship-loading, storage of basic products at the plant-site and storage at the port of a user-owned terminal. As our storage installations are integrated in the production workflow, they are designed to be compact, robust and highly dependable. To ensure flawless operation, ESI Eurosilo provides extensive inspection and maintenance services and worldwide round-the-clock technical service.



Ammonium sulphate silo with wooden inner wall

Safe and versatile material handling

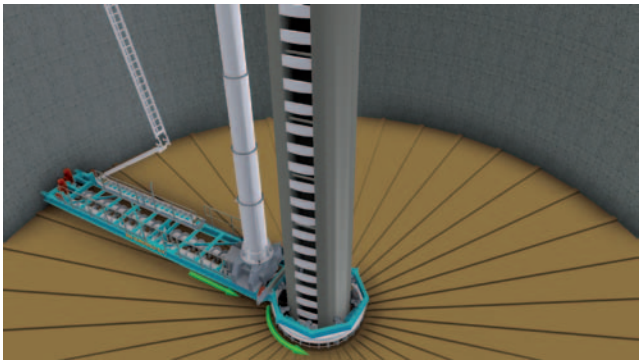
In order to deal with the hygroscopic characteristics of some basic materials, our enclosed storage facilities are designed to keep out moisture that will cause stored materials to deteriorate. Use of non-corrosive materials protects the storage facility from damage or leaking due to corrosive content. Filling and reclaiming of non-free flowing materials like ammonium sulphate or common salt can be perfectly handled by the slotted column system. This system is a well-proven concept to reclaim materials that are too cohesive for a core-flow system as used for coal in coal fired power stations.



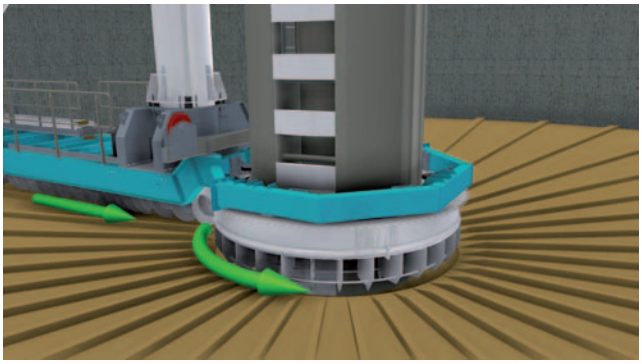
Working principal of the slotted column

15,000 m³ Common salt, The Netherlands

2 x 40,000 m³ Ammonium sulphate, Korea



Shutter column system



Shutters and ring conveyor

Newly developed shutter column system

Besides the core-flow system with or without centre column and the slotted column system for cohesive products, a newly developed shutter column system is available. The system is well suited for storing materials with a very small particle size like fly ash or electric arc furnace dust (EAFD) as produced in recycling plants. These products tend to fluidize during the filling process of the silo and by programming the opening and closing of the shutters, the products can be handled in a controlled manner.

Key features of the Eurosilo® system

- Controlled storage for hygroscopic materials
- High automation capacity minimizes operating costs
- Compliant with severe environmental regulations
- High safety standards for health hazardous materials
- Maximum logistic control and flexibility
- High availability due to minimal downtime

Bridging agricultural production and market demand

Economic value in store

In order to regulate agricultural production and to meet market demand, agricultural products like soybean meal or potato starch are stored in large facilities. The Eurosilo® system is developed to store huge quantities of potato starch, so that it is available in between two successive seasons. Using the first-in, last-out (FILO) principle, the Eurosilo® system is well suited to store semi-basic products. Considering the economic value of market fluctuations, the capital investment and low running costs of the Eurosilo® system is an attractive alternative.

Foundation of ESI Eurosilo

The roots of our company lie in the agricultural industry. For AVEBE, a Dutch potato starch manufacturer, we developed the first silo in the late 1960's. As the production of potato starch is subject to seasonal influences, while sales tend to fluctuate, the company needed huge storage facilities for long-term storage. The earliest installations were delivered to the Dutch market, but the application spread across Europe during the 1970's. More recently, we delivered multiple potato starch silos in Japan as the Japanese potato starch industry decided to rationalize and modernize at the start of the new millennium. The most popular choice of storage system for Japan's leading potato starch manufacturers is the Eurosilo® system.

21,000 m³ Potato starch, Japan

Potato starch silo, Japan

Silo system for agricultural bulk solids

In the silo, the bulk solid contents accumulate in horizontal layers. The material enters the silo through the top centre of the silo, descends through a telescopic chute and is distributed uniformly by means of a screw conveyor system suspended from a slewing-bridge structure. For reclaiming, the core-flow system with centre column is ideal for agricultural bulk such as potato starch and soybeans. The silo is equipped with of a screw reclaim mechanism, centred round the central column, combined with outlet units of oscillating beam feeders at the bottom of the silo.

Safe and sound

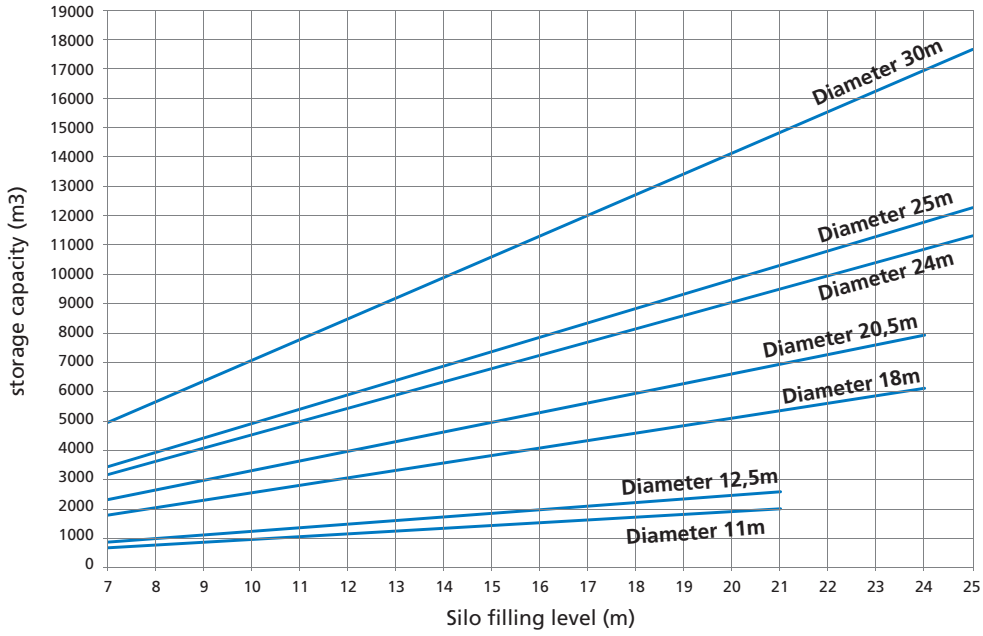
The silos for agricultural bulk are engineered to keep the content safe, even after long-term storage. Use of stainless steel, moisture-free conditions and the elimination of residue inside the silo prevent the organic material to rot or deteriorate in any other way. Danger of explosion due to dust is minimised by use of spark-free motors and an ATEX qualified design. Detection devices and fire extinguish equipment are also available.

Key features of the Eurosilo® system

- Controlled storage and reclaim for agricultural bulk
- No product degradation
- Safety measures up to ATEX and NFPA standards
- Maximum logistic control and flexibility
- High availability due to minimal downtime
- Fully automated operation using data bus method

ESI Eurosilo® BV

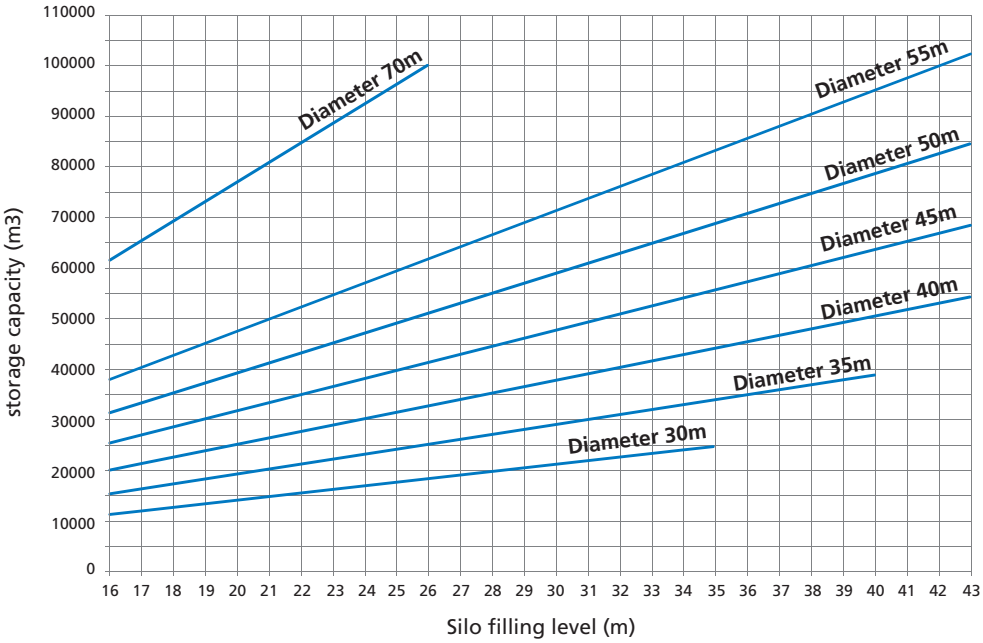
Silo configuration up to 17,500 m³



(Potato Starch,

North America **4**
(Potash, Lignite,Gypsum)

Silo configuration up to 100,000 m³



"A well proven global concept"

Slewing bridge assembly

Potato starch 60,000 m³, The Netherlands

FGD gypsum silos, Hongkong

Limestone and FGD gypsum silo, Poland

Shipment of slotted column

FGD gypsum silo under construction, Germany

Coal silos and FGD gypsum silo, Germany

Coal silos, USA

100,000 m³ Coal silo internal, Germany

FGD gypsum silo, Japan

Ammonium sulfate train load out

Wall structure

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ULTIMATE STORAGE SOLUTIONS FOR BULK SOLIDS

Newtonstraat 26-28
P.O. Box 1047
1440 BA Purmerend
The Netherlands

Tel : +31(0) 299 - 630730
Fax : +31(0) 299 - 630737
E-mail : esi@eurosilo.com
Web : www.eurosilo.com