SLUDGE DRYING TECHNOLOGIES

Redco Process Company Profile

- REDCO Process was established in 2012 to provide system solutions and equipment for sludge drying and incineration technologies.

- REDCO provides Low Temperature Belt Dryers, Solar Drying Plants and Quick Dryers for sewage sludge with a capacity of 1 ton / day to 800 tons / day with its experienced team for many years. In addition, Fluidized Bed Combustion Systems are also in the product range.

Sludge Drying Technologies

1. Solar Sludge Drying Plants
2. Thermal Sludge Drying Plants
    - 2.1. Belt Dryer
    - 2.2. Thermal Sludge Dryer with heat pump

Sewage Sludge Final Disposal Processes

Dewatered Sludge

Drying Technologies

Solar Sludge Dryer

Thermal Dryer

Incineration

Landfill

Using on soil

RDF production&alternative fuel

Advantages of Sludge Drying Systems

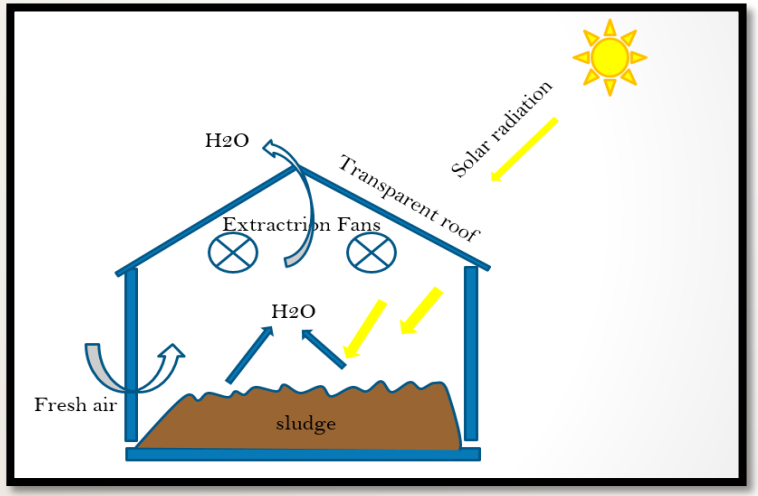
- The most important feature of sludge drying systems is that the sludge drying process is a solution to sewage sludge wastes, one of the biggest environmental problems of recent years.
- However, dried sludge also has many environmental benefits.
- As a result of the decrease in the amount of sludge, a significant saving is achieved in the disposal fees to be paid to the transportation and final disposal point.
- Sludge drying is necessary to maintain the stability of landfills where final disposal takes place.
- The calorific value of the sludge is increased as a result of the drying process. Thus, after the treatment sludge is dried, it can be given to cement factories as an alternative fuel.

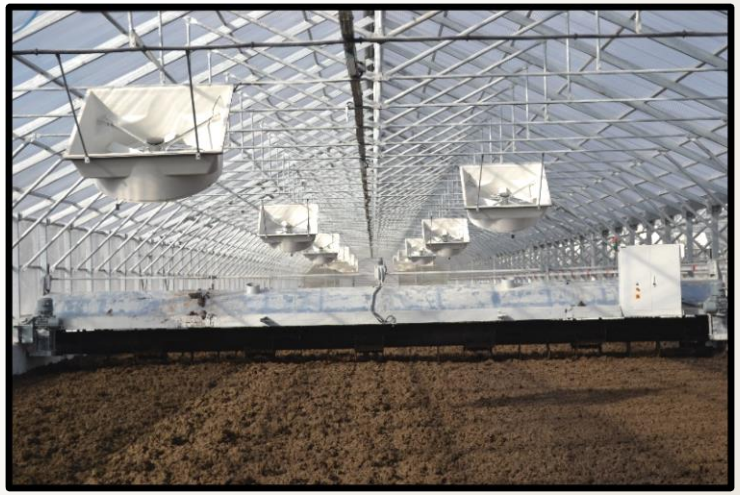
1- SOLAR SLUDGE DRYING SYSTEMS

- Solar dryers provide drying of sludge using meteorological data. Therefore, its energy requirement is lower than other drying systems. With the power of solar energy, water is evaporated by natural solar radiation.

SOLAR DRYING WORKING PRINCIPLE

- The sludge is heated by the sun's rays and the water in it evaporates. What is important here is the rapid removal of moisture. REDCO12® sludge mixing machine rotates continuously during the drying process to aerate the sludge. Thus, the sludge remains aerobic, preventing the formation of bad odors and the water in the sludge evaporates.
- The sludge laid on the ground in a greenhouse surrounded by a polycarbonate sheet that ensures the best use of solar energy is exposed to direct sunlight. The sludge is laid on the ground with a maximum thickness of 50 cm and mixed in mixer machines. Thus, the moist part at the bottom is taken to the top, and the dried part to the bottom.





SOLAR DRYING WORKING PRINCIPLE

- The water in the sludge evaporates under the influence of solar energy, and the moisture layer resulting from the evaporation on the sludge surface moves away from here and spreads to the greenhouse with the help of the circulation fans placed 10 meters apart on the greenhouse ceiling. Partially saturated air is removed from the system with the help of exhaust fans at the entrance and exit of the greenhouse, and fresh air is provided to the system from the sides of the greenhouses. The sludge reaching the desired dryness is removed from the system with the help of loader or automatic discharge system. The system is constantly controlled via remote communication.

Advantages of Redco Solar Drying System

- There is no need for external energy source other than solar energy (natural gas, fuel oil, etc.).
- Reduces disposal costs due to volume reduction.
- The sewage sludge mass is reduced by approximately 3/4.
- After drying, a granule is produced that can be stored without bad odor.
- The machine makes 1 turn in 55 minutes in the 150 m long hall. Thus, the time required for fermentation to occur within 2-3 hours cannot be reached.
- Since REDCO® technology is not a shovel type, all sludges to be dried can come into contact with air. Thus, the formation of bad odor is prevented.
- Back-mixing affects the drying efficiency as it causes operational and operator related problems. REDCO Solar Drying System will dry the sludge gradually without the need for back-mixing and at the end of the hall, the sludge will be obtained in the desired dryness.
- Since REDCO® technology is not a shovel type, there is no risk of getting stuck in the sludge. Efficient drying will take place continuously thanks to the stainless steel blades.
- Operational cost is low. Depending on the energy and labor cost, it is between 4-7 USD / ton of sludge.
- During operation, the drying system does not require a constant operator. This provides a high level of job security.
- The entire drying plant is automatically controlled by the PLC, including the REDCO12® system and ventilation. Personnel requirement will not exceed 20-30 minutes a day.

2. THERMAL SLUDGE DRYING PLANTS

2.1. BELT TYPE SLUDGE DRYING SYSTEMS

- REDCO RBD series drying system is a very efficient method for drying sludge. Low emissions and a high quality end product in the form of dust-free granules together with low operating costs are the striking advantages of the REDCO belt dryer technique.

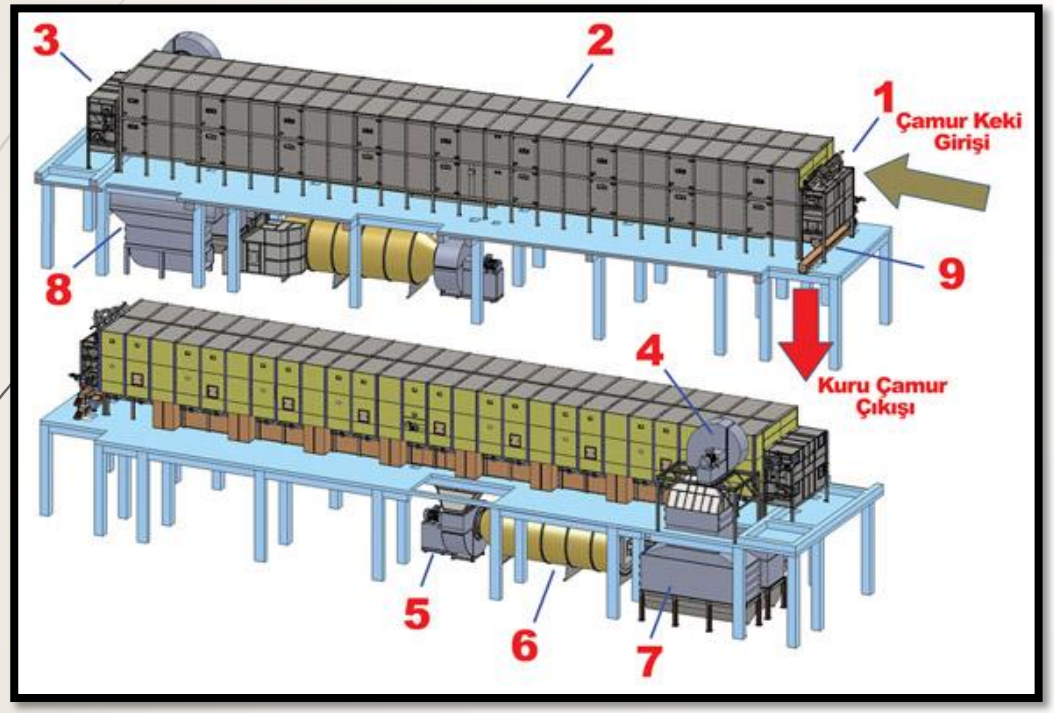
Belt Type Dryer Working Principle

- Dewatered sludge with about 20-30% DM content is fed to the dryer.
- The moist sludge cake is pressurized to 15-16 bar by means of a pump and fed to the granulation unit placed in the feeding section.
- The granulation unit ensures that the sludge is distributed uniformly on the belt in the form of pasta pieces with a diameter of 5-13 mm (depending on the sludge structure).
- A special cutting mechanism ensures that the pasta pieces are uniform in length and the nozzles are constantly clean. The belt conveys the dispersed sludge cake to the drying chamber.

Belt Type Dryer Working Principle

- The air, whose temperature is raised to 90 - 150 ° C by the heater, is fed into the drying tunnel and passed through the sludge bed.
- Thanks to the heat recovery system, at least 50% of the hot air is reused.
- To achieve a homogeneous end product structure, when the sludge batch reaches the middle of the bottom belt, it is inverted and mixed with a mixing device.
- The product that has passed through the drying chamber is transferred to a conveyor at the end of the belt, ready to be transferred to other stages of the process.
- At the end of the process, dried sludge with 65-95% Dry Matter content can be obtained.

Belt Dryer System Design



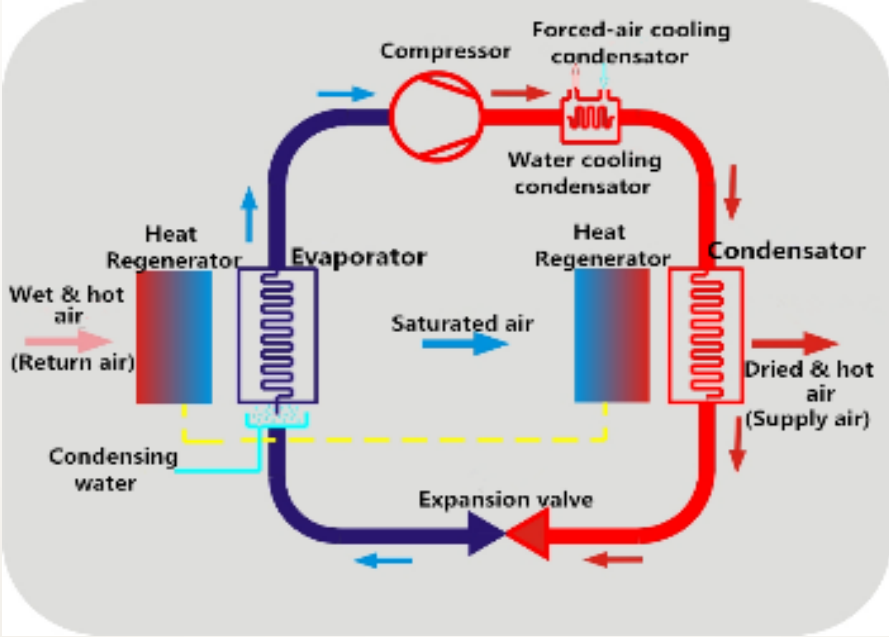
1. Granulation Unit
2. Drying Tunnel
3. Belt Drive Group
4. Recuperation Fan
5. Hot Air Fan
6. Hot Air Boiler
7. Heat Exchanger
8. Wet Scrubber Unit
9. Output Conveyor

2.2. Thermal Sludge Dryer with Heat Pump

- The dryer adopts direct low temperature drying. Direct low temperature drying makes hot effect on sludge, producing high thermal efficiency. Moreover, low temperature protects organism in the sludge from splitting and volatilization, while the circulation hot wind takes only water out from the sludge.
- Drying temperature is 45-50℃ (temperature of the recycle to dehumidification heat pump), while blowing-in temperature is 60-75℃ (bottom layer).
- Dehumidification heat pump sludge dryer makes use of dehumidification heat pump to carry out the sludge through hot-air recycling, condensing, dehumidifying and drying. The evaporation of the sludge moisture produces latent heat. And the condensation of vapor on heat pump requires latent heat as well. Both process of latent heat is equal according to the law of conservation of energy.

Thermal Sludge Dryer with Heat Pump

- As a result, drying process does not require additional heat capacity. The energy consumed during the process is the electricity for the input to compressor, fan and motor.
- This dehumidification dryer is equivalent to the combination of dehumidification heat pump and mesh belt conveyor.



REDCO PROCESS REFERENCES in TURKEY

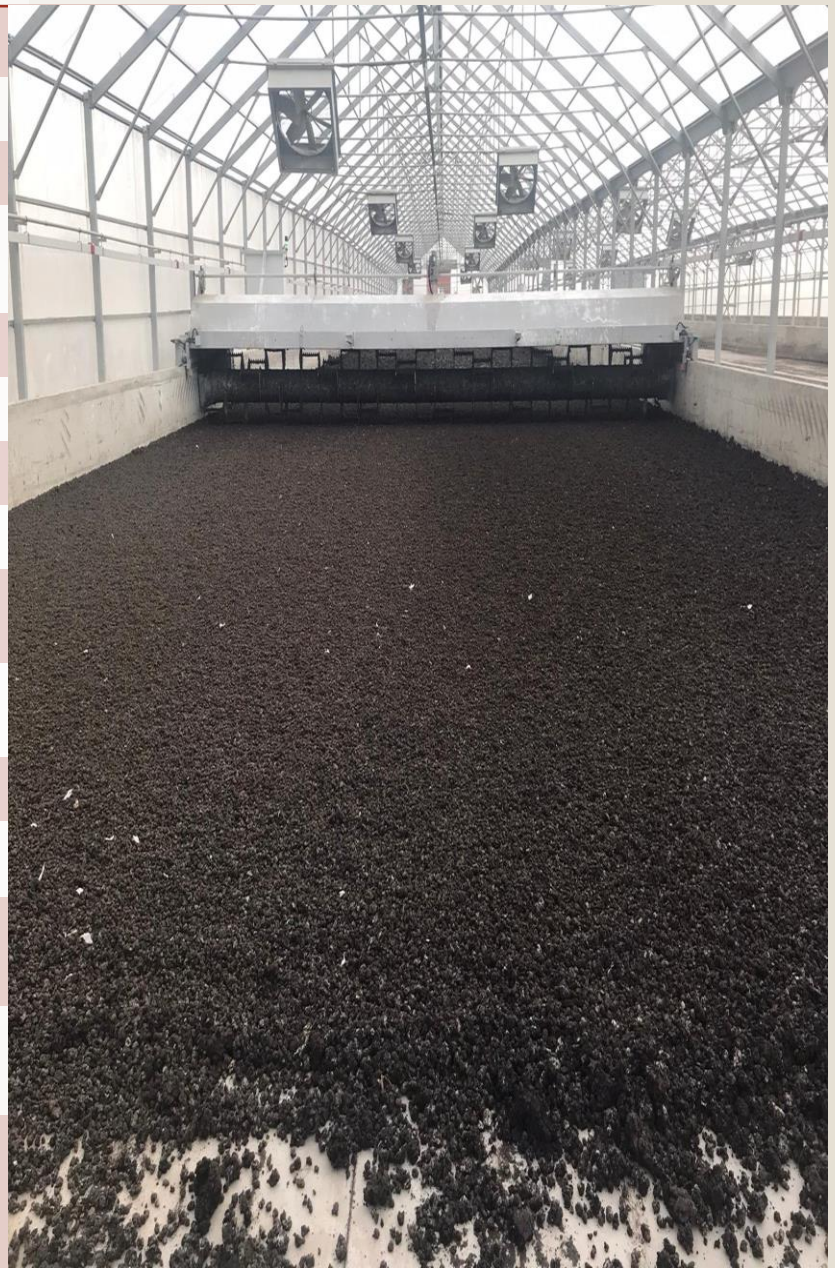
REDCO ON-GOING PROJECTS in TURKEY and EUROPE

BELT TYPE SLUDGE DRYING REFERENCES

End-User	Capacity	Wet Sludge Inlet DS	Dry Sludge Outlet DS	Commissioning Date
COMPLETED PROJECTS				
ÇORLU LEATHER IOZ	80 tons/day	22%	50%	2015
IZSU ÇİĞLİ WWTP	800 tons/day	22%	90%	2013
HEXAGON BIOSUN	78 tons/day	45%	65%	2014
AFYON ENERGY	75 tons/day	25%	70%	2016
SAMSUN MUNICIPALITY	144 tons/day	30%	90%	2017
KAHRAMANMARAŞ MUNICIPALITY	160 tons/day	25%	90%	2018

SOLAR SLUDGE DRYING REFERENCES

End-User	Capacity	Wet Sludge DS	Dried Sludge DS	Com. Date
COMPLETED PROJECTS				
AKHİSAR MUNICIPALITY	24 tons/day	22 %	50 %	2012
ÇERKEZKÖY IOZ	3 tons/day	22 %	50 %	2012
MASKI TURGUTLU MUNICIPALITY	19 tons/day	25 %	70 %	2012
İZSU HAVZA WWTP	5,5 tons/day	20 %	80 %	2014
İZBAŞ FREE ZONE	15 tons/day	20 %	80 %	2015
ANTALYA IOZ	10 tons/day	45 %	90 %	2015
MASKİ	20 tons/day	25 %	90 %	2018
ŞANLIURFA ŞUSKİ (WABAG)	120 tons/day	25 %	90 %	2018
KİLİS MUNICIPALITY (UNDP)	24 tons/day	22 %	90 %	2019
UŞAK IOZ	30 tons/day	25 %	50 %	2019
UNILEVER KONYA WWTP	10 tons/day	22 %	80-90 %	2021
ALAŞEHİR MUNICIPALITY	10 tons/day	22 %	90 %	2021
MOROCCO DAKHLA WWTP (BIWATER)	20 tons/day	22 %	60-80 %	2022
KASTAMONU MUNICIPALITY WWTP (IPA EBRD PROJECT)	30 tons/day	25 %	90 %	2022



SOLAR SLUDGE DRYING REFERENCES

End-User	Capacity	Wet Sludge DS	Dried Sludge DS	Com. Date
ONGOING PROJECTS				
MOROCCO-HAD SOUALEM WWTP (PWT)	20 tons/day	22 %	60-80 %	---
IĞDIR MUNICIPALITY WWTP (IPA EBRD PROJECT)	31 tons/day	25 %	85 %	---
BİSMİL MUNICIPALITY WWTP (IPA EBRD PROJECT)	14 tons/day	22 %	85 %	---
SORGUN WWTP (IPA EBRD WWTP)	13 ton/day	22 %	50 %	---
PLOVDIV WWTP (BULGARIA/ KWI INT.)	4500 tons/year	20 %	70 %	---
SLIVEN WWTP (BULGARIA/KWI INT.)	27,4 tons/day	25 %	70 %	---
ZAPRESIC WWTP (CROATIA/ RIKO d.d.o.)	14,7 tons/day	25 %	60 %	---
YÜKSEKOVA WWTP SOLAR DRYER (Arbiogaz)	15,5 tons/day	22 %	50 %	---
NİKSAR WWTP SOLAR DRYER (Çevtaş)	15,12 tons/day	22 %	90 %	---

ŞANLIURFA METROPOLITAN MUNICIPALITY, TURKEY
(SUPPORTED BY EUROPEAN UNION IPA PROJECTS)

ONE OF THE LARGEST SOLAR DRYING PLANTS IN THE MIDDLE EAST

INFORMATIONS OF MAINLY COMPLETED SSD REFERENCES

SANLIURFA METROPOLITAN MUNICIPALITY, TURKEY (EMPLOYER, WABAG)

ONE OF THE LARGEST SOLAR DRYING PLANTS IN THE MIDDLE EAST

- The plant has constructed as 12 holes for 120 tons/day dewatered sludge that produced from Şanlıurfa Municipality Waste water treatment plant.
- Design dryness

  min. 25 % DS for input sludge

  min. 90 % DS for output sludge
- Dried sludge used on soil

Kilis Municipality, Kilis, TURKEY
(EMPLOYER, REMONDIS; SUPPORTED BY UNDP)

- The plant has designed as 3 holes (1 hole length:100 meter) for 24 tons/day dewatered sludge that produced from Kilis Municipality Waste water treatment plant.
- Design dryness min. 25 % DS for input sludge ,

  min. 85 % DS for output sludge
- Manuel sludge feeding
- Automatic dry sludge transferring
- Final completion of the plant:

  28.07.2021

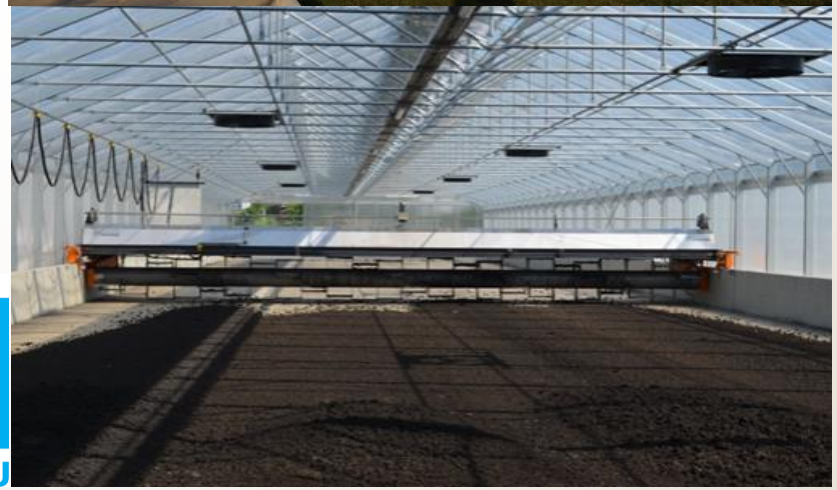
Empowered lives.
Resilient nations.

Kastamonu Municipality,Kastamonu TURKEY
(SUPPORTED BY EBRD)

- Kastamonu SSD plant has been constructed to dry sludges that sourced of Kastamonu waste water treatment plant that capacity of 30 tons/day.
- The plant has designed to dry minimum up to 90 % DS, for average 25 % DS for dewatered municipal 10.950 ton/year sludge.
- The hole length is 150 m and width 12 m, 3 halls.
- Sludge feeding is autamatically, dry sludge transffering is also automatically.

HAVZA Solar Sludge Drying Plant/ İZMİR Municipality

- HAVZA SSD plant has been constructed to dry sludges that sourced of Havza waste water treatment plant that capacity of 5,5 tons/day.
- The plant has designed to dry minimum up to 80 % DS, for average 20 % DS for dewatered municipal 2000 ton/year sludge.
- The hole length is 120 m (2*60m) and width 12 m.
- Sludge feeding is manual, dry sludge transffering is automatically.
- IZSU Municipality has been operating since 2015.



İZBAŞ Solar Sludge Drying Plant /İZMİR Industrial Free Zone

- The plant has designed as 2 holes (100 meter) for 15 tons/day dewatered sludge that produced from İZBAŞ Industrial zone waste water treatment plant.
- Design dryness min. 22 % DS for input sludge ,

  min. 50 % DS for output sludge. Now, 85 % DS in summer time.
- Automatic sludge feeding
- Automatic dry sludge transferring
- The plant has completed and trial operating was completed at 11.07.2017.

UNILEVER HPC Factory Solar Sludge Drying Plant, Konya

- The plant has designed as 1 hole (1 hole length:150 meter) for 10 tons/day dewatered sludge that produced from UNILEVER HPC Factory waste water treatment plant.
- Design dryness min. 22 % DS for input sludge ,

  80-90 % DS for output sludge
- Automatical sludge feeding
- Automatical dry sludge transferring

SLUDGE DRYING PROCESS IN BELT DRYER

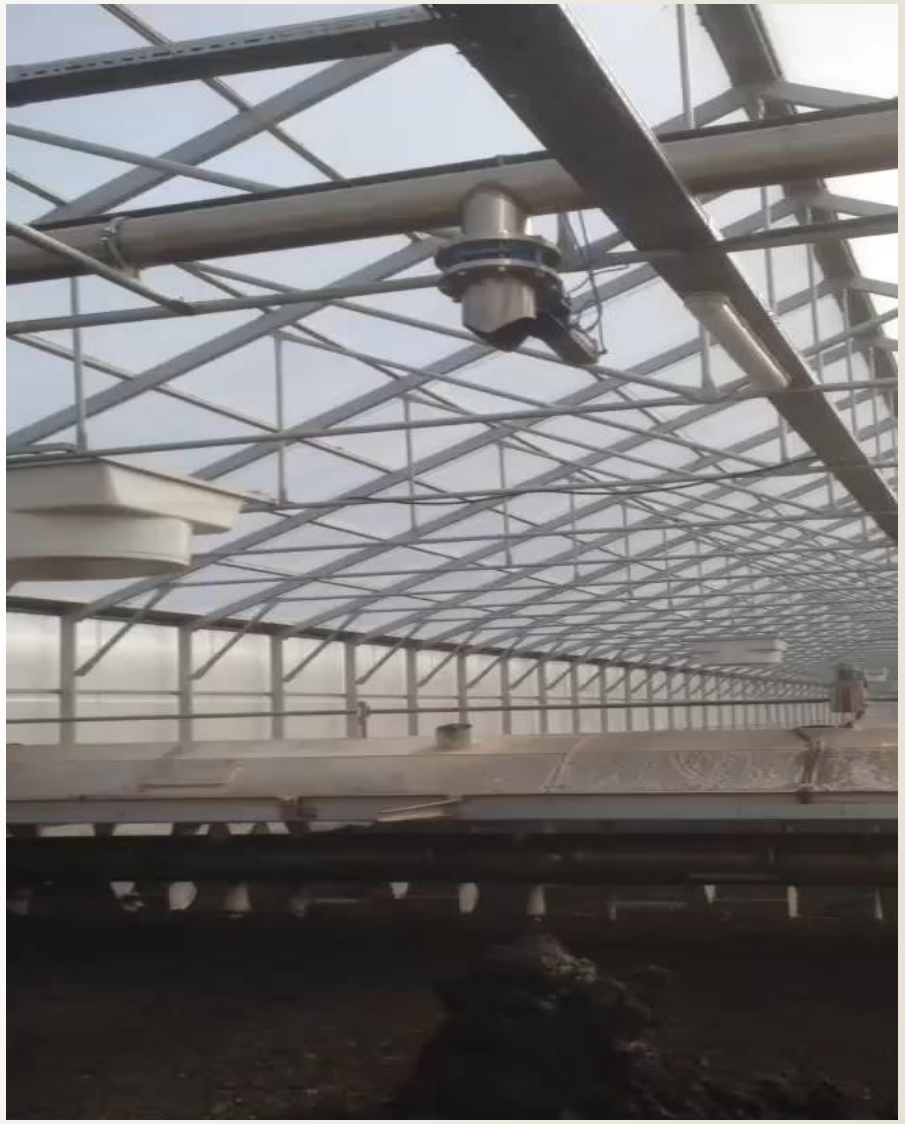
Please click to video

KİLİS MUNICIPALITY SOLAR DRYING MACHINE

Please click to video

SLUDGE FEEDING SYSTEM WITH PUMP FOR SOLAR DRYING

Please click to video



DRY SLUDGE AFTER SOLAR DRYING

Please click to video

THANK YOU...