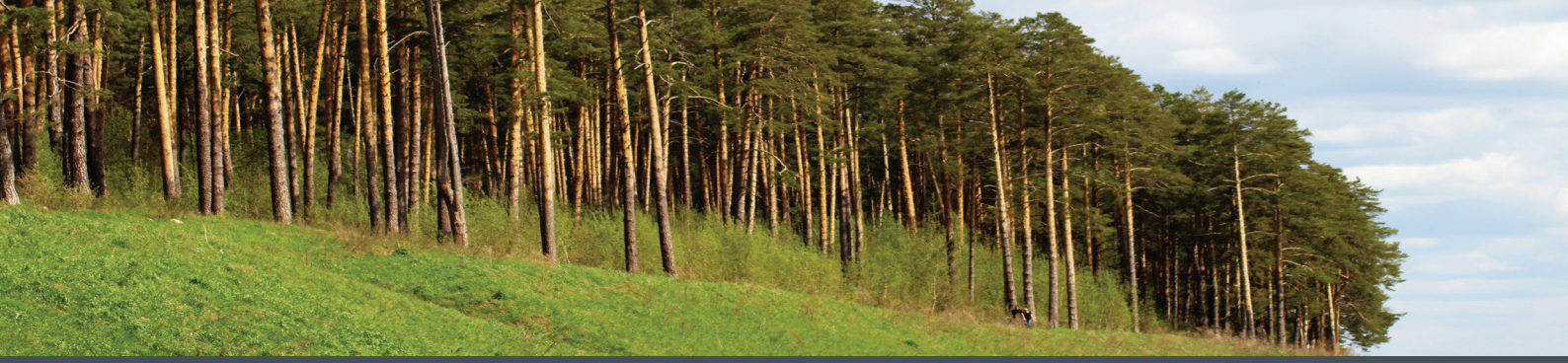


bGen™ - Energy when you need it

High Temperature Energy Storage for Industrial Heat

BRENMILLER ENERGY

bGen™ - BS-7011

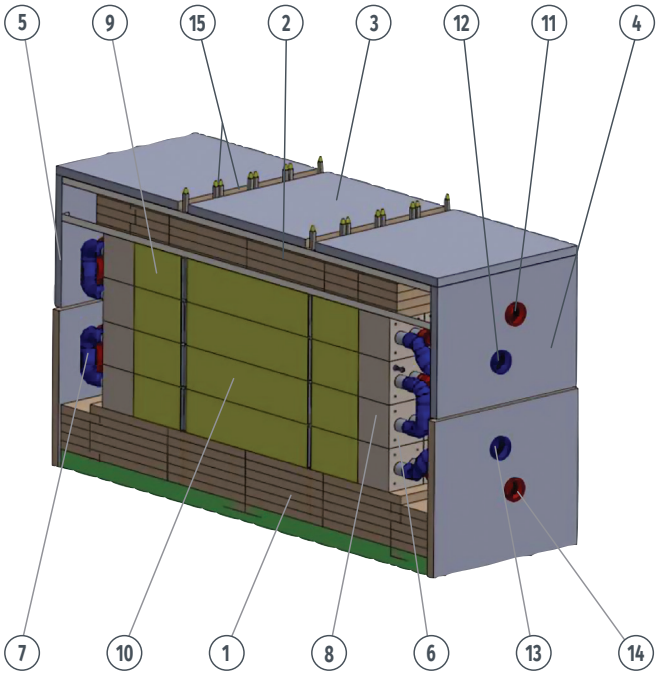
Storage Based Steam Generator

Charge with Biomass, Deliver Industrial Heat on Demand

DESIGNMASTER

Product Functionality

The BS-7011 product from Brenmiller Energy is a high temperature Energy storage unit, charged from a Biomass energy source when heat is available. Through the patented technology, utilizing inherently the heat exchanger, the steam generator and the storage media, the charged heat is stored internally and delivered as Industrial Steam, Hot water or Hot Air only when required to by the industrial process or tool. The technology decouples between the continuous charging time of the Biomass source and the different delivery time slots of the output. Therefore, the Biomass source can be used for charging over 24 hours while the BS-7011 can deliver its steam or Hot water from the internal heat only at the selected time slots, as required by process or tool. The system functionality is of a high importance for industries where the Natural Gas is more expesive than the Biomass source, pellets or wood chips, and for small and medium factories which can not switch to Biomass due to the economics of smaller factory steam consumption. Multiple BS-7011 units can be used to form the required size.



Key Advantages

Renewable Enabler – The unit enables to use intermittent and non-uniform Biomass sources for a supply of steady steam or hot water.

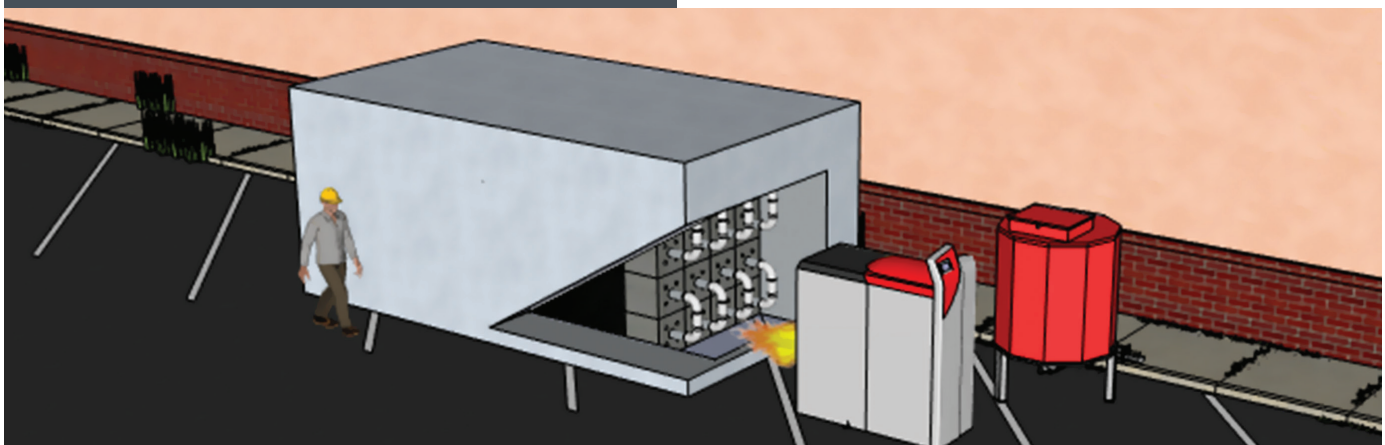
Flexibility – The ES-7011 can accept a wide range of charging inputs, from 350°c to 750°c

Lifetime – The used storage media enables tens of thousands of charge/discharge cycles with no performance degradation for a 30 years lifetime

Modularity – Multiple units can be utilized to form a size which matches the customer need

No Hazardous – The system is built from green only materials with no hazardous to the environment or special chemicals inside.

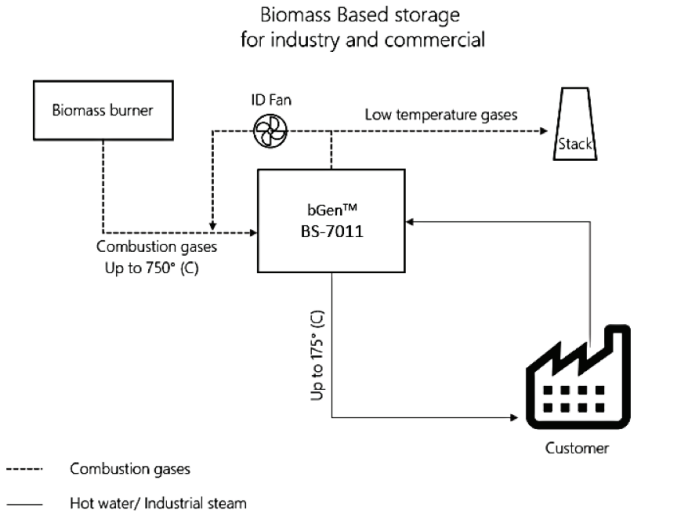
1. Bottom Insulation
2. Top Insulation
3. Sealed Housing
4. Front Housing
5. Back Housing
6. Internal Interconnecting Piping
7. Back Interconnecting Piping
8. Front Insulation
9. Back Insulation
10. Storage Media Cubes
11. Inlet Biomass Gasses
12. Outlet Fluid Supply
13. Biomass Returned Gasses
14. Returned Supply Fluid
15. Unit Handling Points

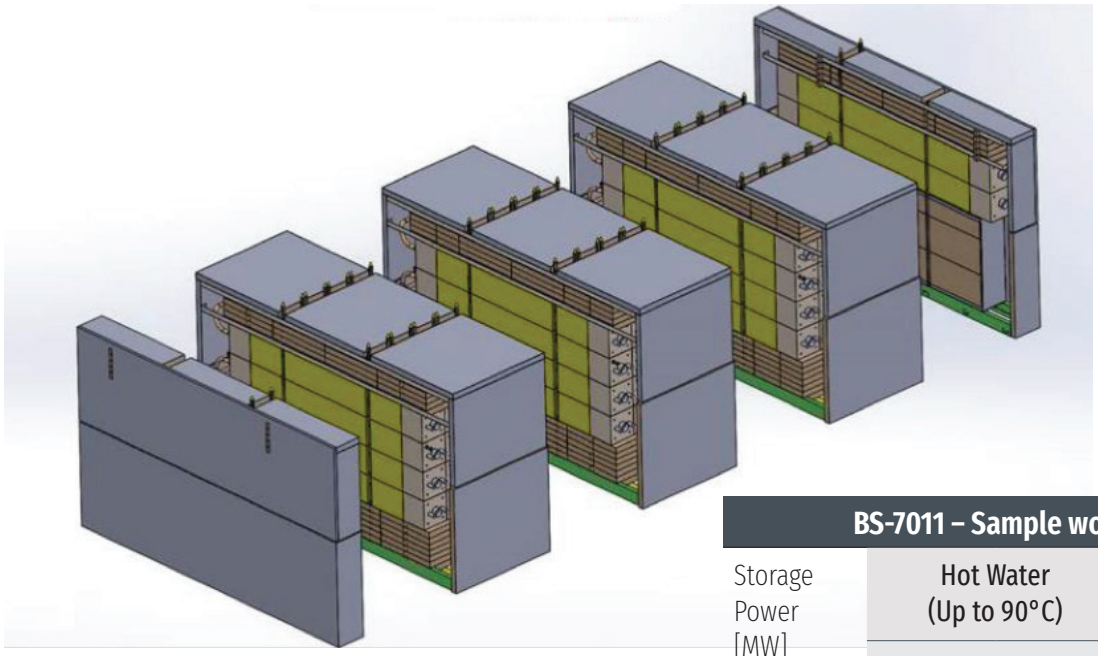


Technical Details and Performance

Hot gasses, up to 750°C, are flowing to the BS-7011 input. These gasses are flowing through the charging piping of the system. Once leaving the delivered heat inside the unit with the storage media, the cooled gasses are output to the stack unit. In parallel or in a totally different timing, cold water is flowing through the separate discharging piping system of the unit and deliver the industrial steam (180°c, 10 bars) to the process or tool. Returned water goes back to the BS-7011 unit for a new cycle of heat delivery. The cooled Biomass gasses are returned to the input cycle for efficiency increase. The 2 separate cycles inside the unit enable a full control and flexibility for the charging and discharging conditions in regards to timing, flow and temperatures.

Multiple such units can be Integrated to form a bigger storage based Steam Generator with a customer required size and optimized interfaces.





The BS-7011 can be activated in different working points. The following table specifies such sample points. One can use it to maximize power or to maximize capacity. The unit maximum delivery is 1 ton of steam.

BS-7011 – Sample working points				
Storage Power [MW]	Hot Water (Up to 90°C)		Industrial Steam (up to 180°C)	
	Storage Capacity [MWh]	Storage Capacity [Hour]	Storage Capacity [MWh]	Storage Capacity [Hour]
0.4	2.40	5.95	1.96	4.90
0.6	2.10	3.50	1.59	2.70
0.8	1.60	2.00	1.32	1.70

BS-7011 - General technical data	
Biomass Burner Power	Max. 750Kw
Biomass Input	Pellets, Wood Chips
Efficiency	80%
External Dimensions (W x H x L)	3.0 x 3.0 x 6.5 m
Heat Losses	3% / 24 Hours
Response Time	60 Seconds

Construction

The BTS-7011 is supplied and shipped as one and integrated unit. Once the ground preparations are performed, installation is short and focused on connections to the required interfaces. Specifications are supplied for the various interfaces according the below topics. Installation and integration are completed when a full acceptance test has been performed.

- SW/Control Interface
- Piping Interface
- Ground preparations
- Water Requirements
- Installation Tools
- Acceptance Test

Safety and Standards

Standard	Description
ISO 9001	Quality management systems
ISO 14001	Environmental management systems
OHSAS 18001	Health and safety management system
CE / UL	Directives for CE/UL listed
ASME 31.1	Power piping
Eurocode8, US ASCE 7-98	Building and foundations
TA-LUFT, BEMS	Gas emissions

Operations & Maintenance

The BS-7011 unit is fully automatic and operated through a software communication protocol. No special local operator is required for operating the system. Local customer maintenance or operating staff will go through a grade A O&M course which will enable them to give full support of the hardware and communication topics. A special monitoring screen for control of the unit will be supplied. Hardware items of the system do not require any preventive or periodic maintenance. Brenmiller Staff will support the customer with any grad B topics which are not covered by the local maintenance or operating staff, upon demand.

Brenmiller Energy, Based on its unique storage technology provides sustainable energy solutions to the distributed generation market. The company was founded in 2012 by Avi Brenmiller, former CEO of Siemens CSP and Solel, and a team of experts in the field of renewable energy. Brenmiller Energy's knowledge and expertise are well grounded and based on years of field experience in designing, building and operating various energy plants in Spain and in the US.