CARBON-FREE HEAT

JUNE 2023
ABOUT

We are a clean-tech company that develops, manufactures and sells our Thermal Energy Storage ("TES") solutions to help decarbonize industrial process heat and power plants.

2012
Founded

$100M
Capital Investments

60
Employees

BNRG
Nasdaq
Tel Aviv
RENEWABLE BASED HEAT IS CRUCIAL FOR NET-ZERO EMISSIONS

GLOBAL FINAL ENERGY CONSUMPTION

ENERGY SOURCES FOR INDUSTRIAL HEAT

Industrial Heat accounts for \(\frac{1}{4}\) of global energy consumption

Industrial Heat is heavily based on fossil fuels

Source: International Energy Agency, Renewable energy for industry, 2017
Thermal Energy Storage

bGen®

- Heat battery based on crushed rocks enabling transition from fossil fuels to renewable energy.
FROM ROCKS TO THERMAL ENERGY STORAGE

- Rocks are crushed to small bits
- Thin metal cells ("bCells") are filled with the crushed rocks
- bCells are stacked into 12m modules
- Modules are assembled on-site to a structure
- Structure is insulated and connected to plant
INNOVATION

Electricity

Heat

High efficiency electrical heaters inside

Heat transfer inside

Steam

Hot Water
DECARBONIZING INDUSTRIAL HEAT
TES potential in mid-temperature process heat

bGen operation temperatures in the range of 100° - 500°c

Global Industrial energy consumption by sector in Exajoules, 2019

Source: McKinsey & Company Global energy Perspective 2022
Integrating TES and renewables

Flexible operation allows replacing fossil-fuel based heat generation for 24/7 operation

TES absorbs intermittency of renewables and delivers clean and stable steam

TES is programmed to charge during off-peak hours for minimum energy cost
Renewables + TES is now competitive

Levelized cost of heat for selected technologies, $/MWh

2. Boiler, heat pump, and charging equipment.
3. Electrolyzer, CCS.
4. Assumes on-site renewables.
5. High-temperature industrial heat pump. Maximum achievable steam temperature is ~160°C.

Source: McKinsey & Company Global energy Perspective 2022
Commercial & Industrial Projects

Thermal Storage based co-generation
Hybrid charging: Exhaust gas and electricity

Biomass to heat storage system
Continuous biomass combustion while delivering fluctuating output
PV + Thermal energy storage
Food Manufacturing plant, Kenya
## Replacing HFO boiler with renewable heat

<table>
<thead>
<tr>
<th>Configuration</th>
<th>20 MW PV + 83MWh TES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steam consumption</td>
<td>8 ton/hr</td>
</tr>
<tr>
<td>Cost of HFO</td>
<td>$1.20 / liter</td>
</tr>
<tr>
<td>Annual fuel savings</td>
<td>$4.7m</td>
</tr>
<tr>
<td>Project cost</td>
<td>$28.1m</td>
</tr>
<tr>
<td>ROI</td>
<td>6 years</td>
</tr>
<tr>
<td>Annual emission savings</td>
<td>9,400 ton CO₂</td>
</tr>
</tbody>
</table>

83% of heat from renewables
Anápolis (GO)

- **Input:** flue gas from burning biomass
  - **Output:** hot air

**Customer’s need:** to replace the burning of LPG with more economical and sustainable fuel - biomass,

- **Storage Capacity:** 1 MWh
- **Charged capacity:** 3 hours
- **Operation Regime:** 16h/day 5 day/week
- **Energy Cost Reduction:** 42%
- **ROI:** 3.38 years
THERMAL STORAGE FOR POWER PLANTS
Coal power plants are retiring, Gas will remain dominant

Global fuel sources for electricity generation in 2020

- Natural Gas: 24%
- Coal: 31%
- Nuclear: 10%
- Solar (PV): 3%
- Wind: 7%
- Hydropower: 17%
- Other Renewables: 4%
- Oil: 4%

Source: International Energy Agency (2021), Net Zero by 2050

US electricity generating capacity additions (historic and expected)

Source: International Energy Agency, Annual energy Outlook 2021
THERMAL ENERGY STORAGE FOR POWER PLANTS

GAS POWER PLANT

Flexible operation for changing grid

- Energy shifting
- Fast ramp-up for spot market
- Additional revenue stacking from capacity payments, grid balancing and frequency regulation

COAL POWER PLANTS

Converting retiring power plants to grid storage

- Utilizing existing infrastructure allows reduction of Capex
- Highly efficient for long duration storage (4+ hours)
- Storing surplus renewable energy and supplying during peak hours
Project Overview

24MWh TES in a combined-cycle gas power plant

- Energy shifting from solar hours to evening peak
- Fast ramp-up to play in the spot market
- Additional capacity payments from increase maximum load & reducing minimum load
GLOBAL FOOTPRINT
ISRAEL, EUROPE, US, BRAZIL
NEW AUTOMATED PRODUCTION PLANT

- Production capacity of 4 GWh of storage modules
- European Investment Bank funding capital expenditure
- Support sales of up to $200m per year
- Designed according to industry 4.0 standards
Thank You