FUEL CELL ADVANCES IN BIOGAS
BLOOM ENERGY

CLEAN, RELIABLE, ONSITE

Always On Energy

LISTED ON NYSE

Ticker: BE

CUSTOMERS INCLUDE 25 of F100

350 MW installed over 600 sites

CLEAN ENERGY MANUFACTURER

World Class Manufacturing Facilities in CA & DE
>600 SITES DEPLOYED WITH SECTOR LEADERS

**CLOUD SERVICES AND TECHNOLOGY**

Apple  Google  IBM  Equinix  Adobe  Microsoft  Oracle  Yahoo!  SoftBank

**CONSUMER AND RETAIL**

IKEA  eBay Inc  Kellogg’s  Macy’s  Target  TaylorMade  Safeway  Urban  Williams-Sonoma, Inc.  Walmart

**MEDIA AND TELECOM**

AT&T  Cox  Disney  verizon  SoftBank  Comcast  NBCUniversal  M&T Communications

**FINANCIAL SERVICES**

J.P. Morgan  Morgan Stanley  Bank of America  Credit Suisse  ADP  Intuit  Franklin Templeton

**HEALTHCARE**

BioMed Realty  Genentech  Kaiser Permanente  Hoag  Life Technologies  Medtronic  Prime Healthcare  Sutter Health

Including 25 of Fortune 100 Companies
**BLOOM’S DIFFERENTIATION**

**High Electrical Efficiency**
- Solid Oxide Fuel Cells are inherently among the most efficient fuel cells
- Less affected by most contaminants and CO$_2$

**High Sustained Output & Availability**
- Modular architecture with 50kW building blocks that are hot swappable

**Customized Solutions**
- Modularity for customized solutions, true to biogas applications as well
- Integrated turnkey solution that includes pre-treatment and O&M

**Integrated supply chain**
- Suppliers and technologies qualified through a rigorous process
MODULAR AND REDUNDANT DESIGN

Fuel Cell
~25W

Stack
~1kW

Server Module
50kW

Server
200-300kW

Power Center
>300kW
DESIGNED WITH SUSTAINABILITY IN MIND

Highly Efficient
Electrochemical process reduces CO₂ emissions; eliminates criteria pollutants such as NOx, SOx, and PM

Renewable ready
Natural gas, biogas, or hydrogen as fuel input

NO COMBUSTION

Water
Water is reused in electrochemical process; no water usage during operation

Power Density
High power output in a small footprint

CARB 2007 CERTIFIED: EXEMPT FROM CA AIR PERMITTING
Server Level Modularity
Each 200-300kW Server has its own dedicated fuel processor & inverter module
Fuel processor provides additional guard capability when combined with centralized pre-treatment
HIGH LEVEL BENEFITS

- Highest electrical efficiency → more kWh/Btu of biogas
- Near-zero criteria pollutants NOx, SOx, PM
- Always On power independent of grid status
- Fully serviced over life with modular, hot-swappable configuration
- Save money on utility electricity spend

1.5 – 2.0X versus a combustion engine

No air permit required
Reliable power when grid not available (even during outages)
No downtime for maintenance
Predictable costs
FLEXIBLE AND SCALABLE DESIGN
BLOOM ON BIOGAS

Biogas

Most Contaminants

Landfill

Wastewater Treatment Facility

Least Contaminants

Dairy

Other Contaminants

CO₂

CH₄

Minimal Pre-treatment

CO₂

CH₄

Bloom Fuel Cells

Electricity to the Customer/Grid
PILOT TO COMMERCIALIZATION STRATEGY

Extensive Lab Testing
- Stacks, Power Modules and Systems tested extensively in the lab
- Map performance characteristics & effect of contaminants

Scout Technology Partners
- Pre-treatment technology that specifically meets Bloom’s system requirements
- Partner suppliers rather than sub-contractors
- All suppliers are subject to Bloom’s supplier development and qualification rigor

Field Study via Pilot Projects prior to Commercialization
- Operate, learn and refine based on field trials on raw biogas
LANDFILL GAS PILOT PROJECT

Active type 1 landfill – accepts construction waste

Siloxanes, H2S, COS, CS2, DMS

~50% Methane

System achieved intended availability and efficiency
APPLICATION TO WASTE WATER TREATMENT

Confident with data and performance from LFG pilot

Identified additional waste water treatment pilot site

Ready to partner with you to solve critical challenges

Face SB1383 with the most efficient solution available

Use of emissions-free, air permit exempt technology

Provide Always On public services in today’s PSPS world
Thank You

Bloomenergy®