



THE GREEN BREWERY PROJECT



Michigan **Engineering**

NATURAL RESOURCES
AND ENVIRONMENT
 UNIVERSITY OF MICHIGAN



POWER PANEL

What is Sustainability?

“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

-Our Common Future, Brundtland Commission (1987)



Why focus on sustainability in craft breweries?

Energy & resource intensity

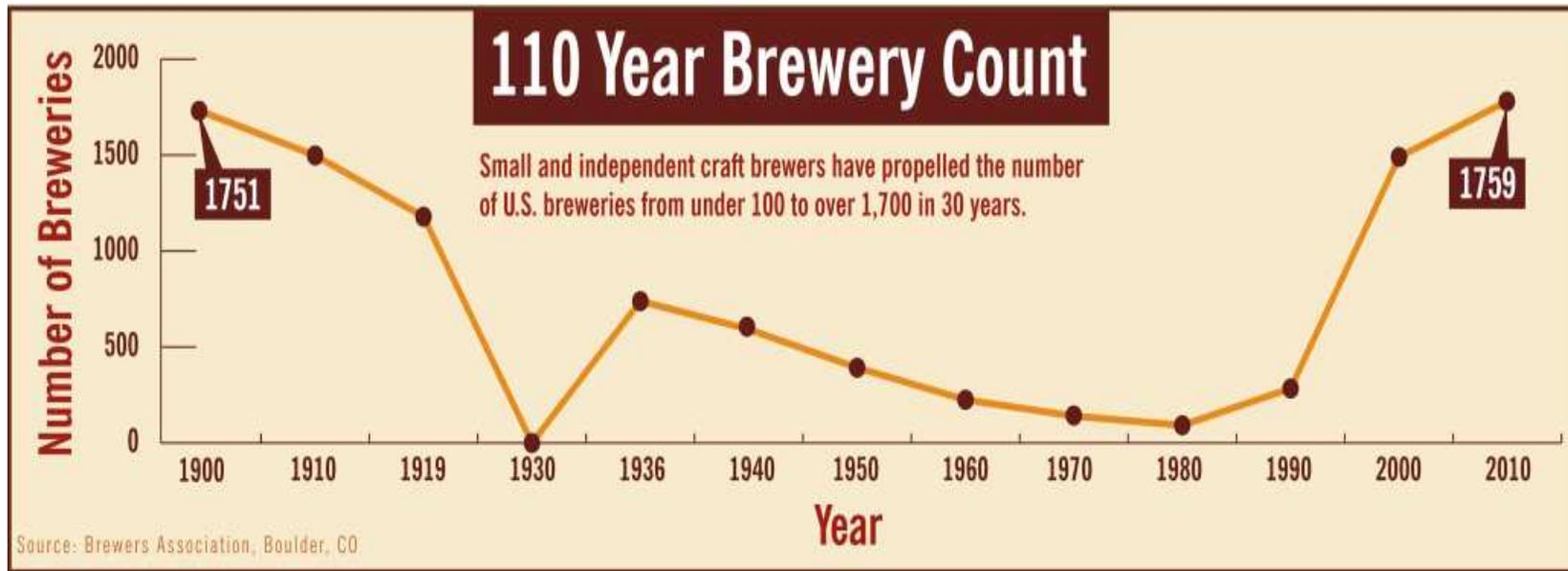


The craft brewing spirit



It's just good business





1,989 breweries in **2011**

15% craft brewery growth (in \$) in 2011

250 new breweries in 2011

Is this sustainable?

Customers Demand It



What can we do?



Renew our commitment



Money Isn't All You're Saving

Invest in efficiency



Generate clean energy

THE GREEN BREWERY PROJECT

Sustainable Brewing
Systems, Practices
and Technology

Jazmine Bennett Jarett Diamond
Gary Fischer Kerby Smithson



Our Method

Measure

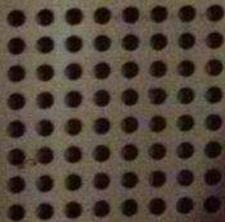
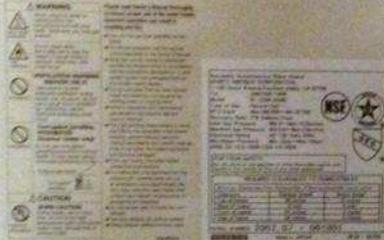
Model

Manage





NORITZ
ALWAYS HOT



NORITZ

PRIORITY BURNER ON

145 gal. °F

WARNING!

DO NOT CHANGE TEMP
(RUNS FOH) -db_{ause}

UP

DOWN

POWER ON/OFF

FLOW METER ALARM SET

RC-7646M-2

BREWERY NORITZ

PRIORITY BURNER ON

180 gal. °F

WARNING

Please read instructions carefully before using this appliance.

- Check actual and controller water temperature before entering shower or bath.
- Hot Water Heater temperature over 125°F can cause severe burns instantly or death from scalding.

UP

DOWN

POWER ON/OFF

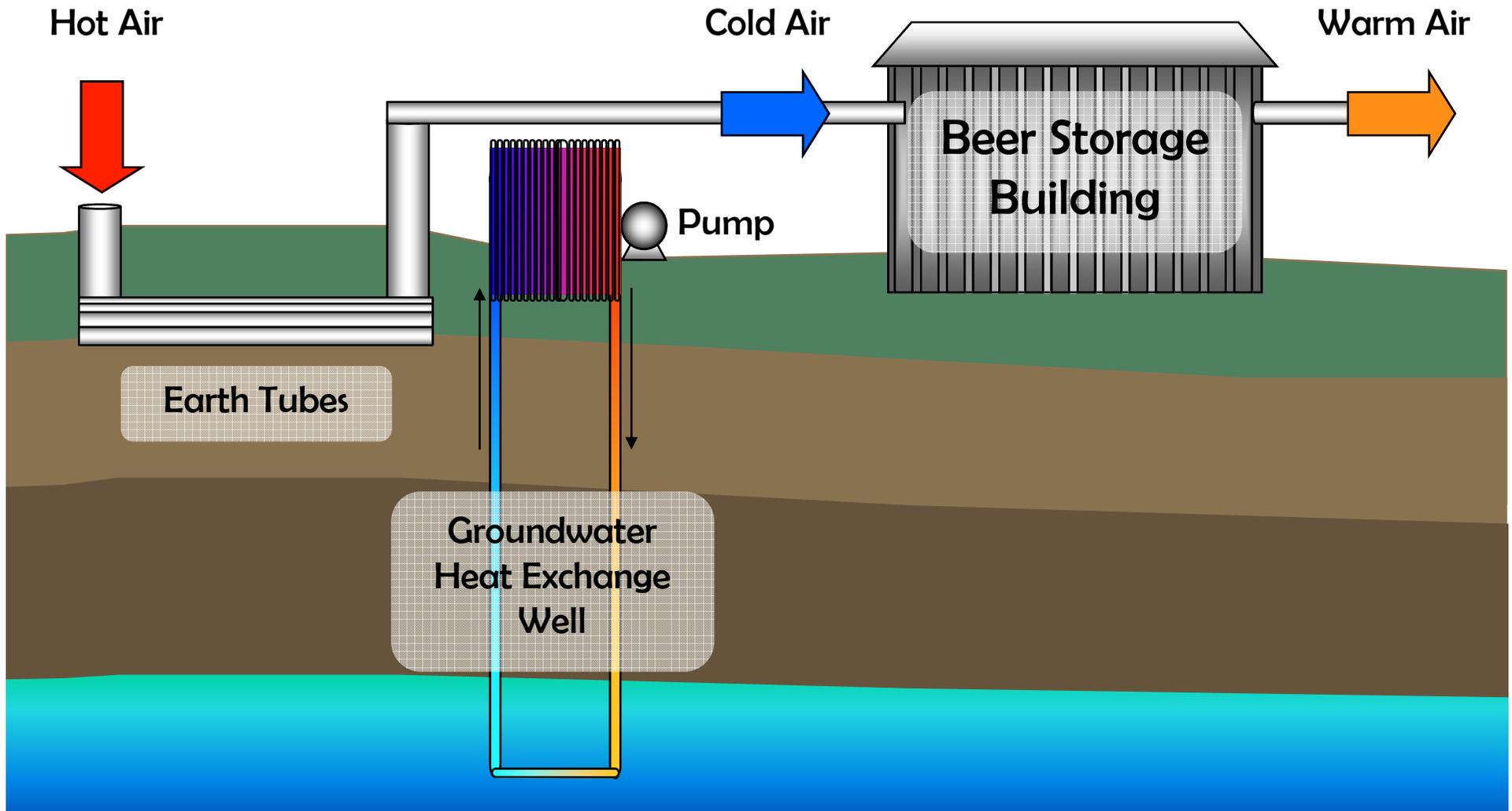
FLOW METER ALARM SET

RC-7649M





Groundwater Source Heating and Cooling













Power Panel Inc. Corner Brewery Project

Thank You:

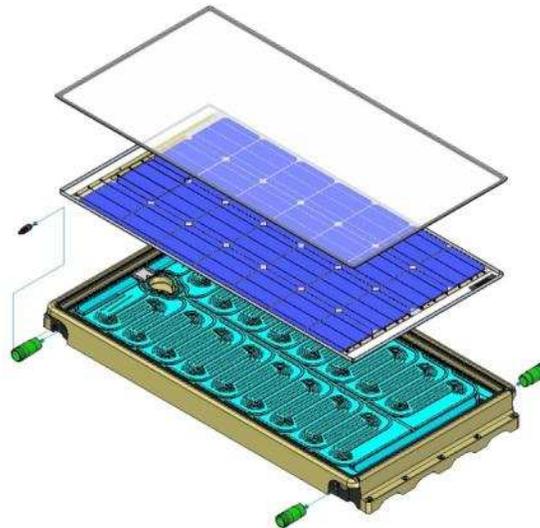
- Arbor Brewing Company, Corner Brewery – Owners, Staff, & Patrons
- Altech Mechanical
- Apple Electric
- The Green Brewery Project
- The Green Panel, Inc.
- Solarsource, Inc.



Power Panel Inc.

Detroit, MI

- Invented in Michigan
- Designed, Developed, and Manufactured in Detroit
- Shipped Globally
- The Next Generation in Solar Technology - Photo Voltaic + Thermal (PVT)
- First solar equipment manufacturer market ready with an efficient solar thermal and solar electric system solution
- 4 X Energy Collection vs. standard PV Technologies



- Power Panel is Rugged and produces both Electrical and Thermal Energy
- Modular and Easily Scalable
- Fixed and Tracker Mounted

Power Panel Projects: State of Michigan

Corner Brewery



- 140 PVT Panels
113.5 kW=16.5 kW/e DC+97 kW/t
- 4 Thermal Edge Storage Tanks
5,280 litres (1,400 gallons)
320 kWhr

FireKeepers Casino



- 540 PVT Panels
426.5kW=62 kW/e DC+364.5 kW/t
- 10 Power Panel Azimuth Tracker
- 10 Thermal Edge Storage Tanks
132,000 litres (3,500 Gallons)
800 kWhr

Michigan Home



- 36 PVT Panels
28.4 kW=4.1 kW/e DC+24.3 kW/t
- 2 Thermal Edge Storage Tanks
2640 litres (700 gallons)
160 kWhr

Power Panel Projects: Global



- Michigan, USA - 5 projects = 102 kW/e + 678 kW/t
- Toronto, Canada – 1 project = 690 W/e + 4.5 kW/t
- Mendaro, Spain – 1 project = 345 W/e + 2 kW/t
- Craiova, Romania = 345 W/e + 2 kW/t
- Algiers, Algeria = 690 W/e + 4.5 kW/t
- Tokyo, Japan = 345 W/e + 2 kW/t



THE GREEN
BREWERY
PROJECT

 **POWER PANEL**