

Brixx Business Plan



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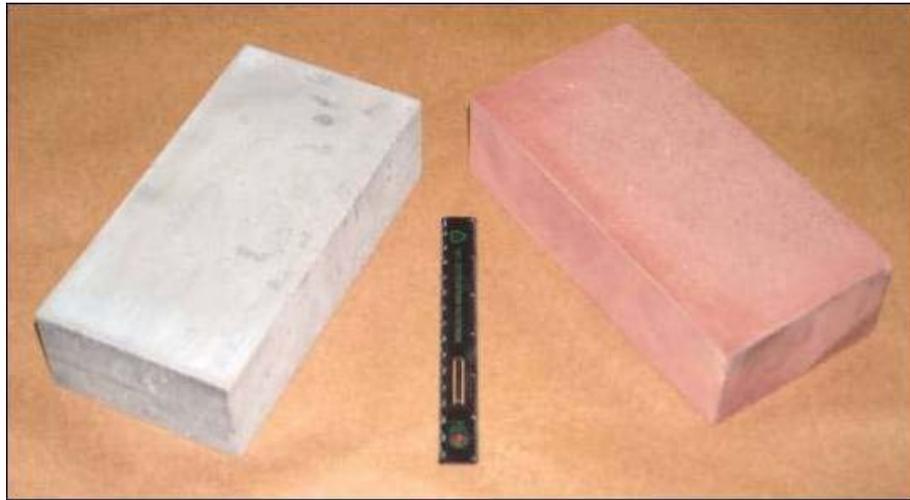
PMET Brixx Opportunity

- U.S. power plants annually produce (2003 figures):
 - 70.1 million tons of coal fly ash
 - 18.1 million tons of bottom ash
- More than 40 % used in variety of applications:
 - Concrete/Cement (45%)
 - Using 1 ton of fly ash in concrete will avoid about 1 ton of carbon dioxide emitted from cement production
 - Structural Fill (22%)
 - Soil/Water Stabilization (13%)
- Remaining ~ 53 million tons that are landfilled

Cost for Power Plants!

PMET Brixx Solution

- Produce a Durable Building Product consisting primarily of Fly / Bottom Ash (90% Recycled Materials) and other Recycled Materials

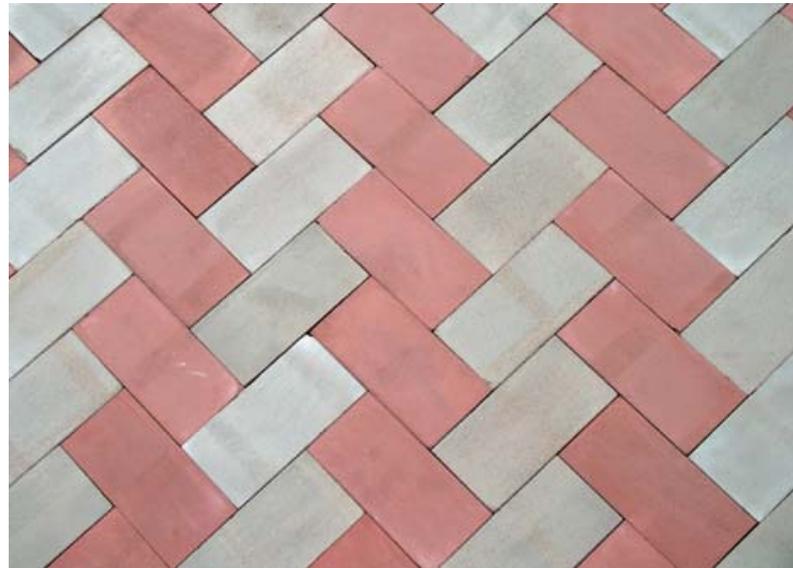


- Competition
 - Concrete and Clay Brick/Pavers
 - Low End of \$0.50 / piece at Home Improvement Store

Brixx Fact Sheet

- 100% Pigmented for Colorfast Shapes
- 8" x 4" x 2 ¼" Modular Size Eliminates Need for Grout ($\frac{1}{16}$ " tolerance)
- Smooth surface: Cleans Easily & Reduces Absorption
- Conform to ASTM Cold Water Absorption Standard
- Exceed Compressive Strength of Commercially Available Pavers
- **Green Building Product – Require Less Energy and 90% Recycled Materials**

PMET Brixx Arranged in
Herring Bone Pattern



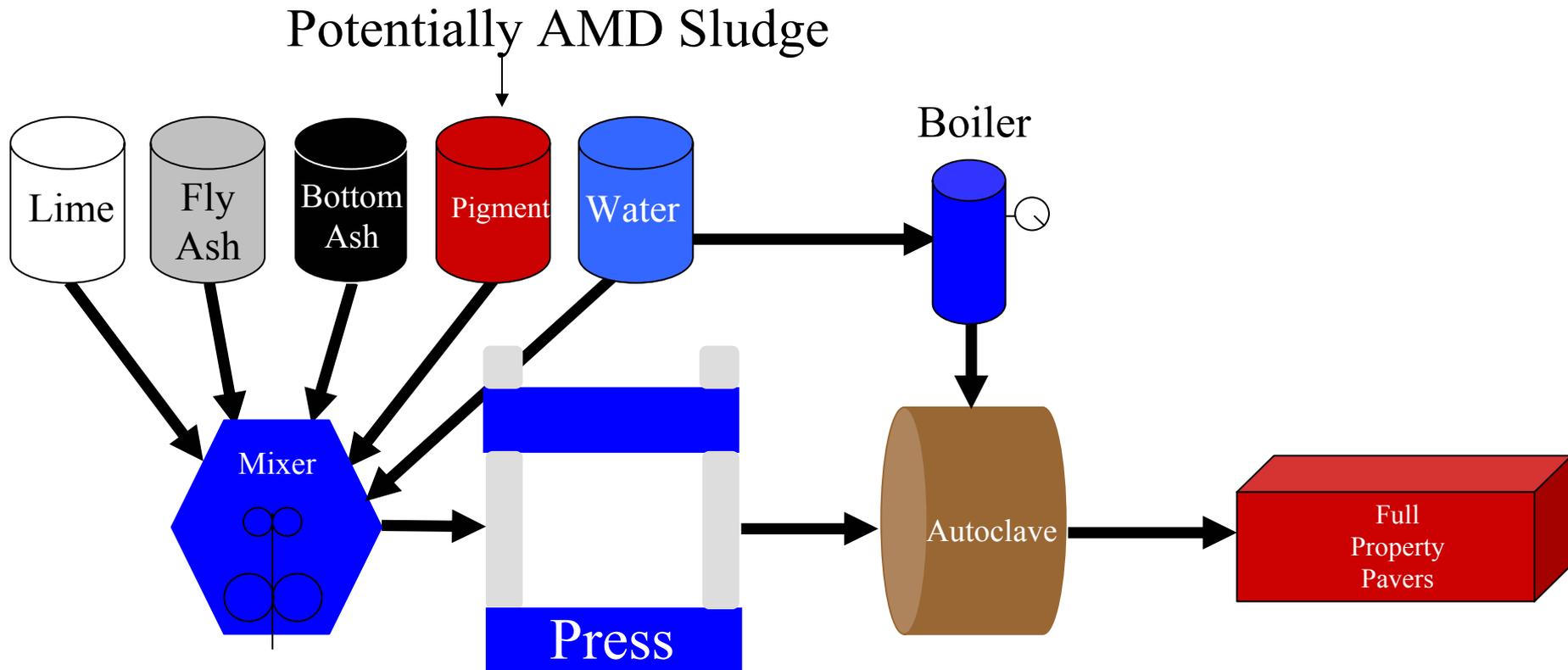
Brixx Coloring

Pigmented in two Earth-tone Colors:
 Gray & Red

Also Colorable with Stains, Enamels, & Epoxies

<p>Pittsburgh Mineral & Environmental Technology, Inc.</p> <p>Technology Development: From Concept Through Commercialization</p> <p>Samples produced using 90% coal combustion by-products.</p>	 <p>As Manufactured</p>	 <p>Treated with Sealer</p>	
 <p>Pigmented Throughout</p>	 <p>Pigmented Throughout & Treated with Sealer</p>	 <p>Waterborne Concrete Stain</p>	 <p>Oilborne Concrete Stain</p>
 <p>Waterborne Enamel</p>	 <p>Oilborne Enamel</p>	 <p>Amine Acrylic Epoxy</p>	 <p>Catalyzed Acrylic Polyurethane</p>

The Technology: PMET Brixx Process



Brixx Manufacturing

Raw Materials

- Current Brixx Produced from ~ Recycled Material
 - 38% Fly Ash (Power Plant Waste Product)
 - 38% Aggregate (Bottom Ash Power Plant Waste)
 - **5% Pigment (Iron-Oxide from Acid Regeneration Process)**
 - 10% Reprocessed Scrap
 - 10% Hydrated Lime
- Currently Seeking Waste Lime Products as Hydrated Lime Substitute

Process

- Raw Materials are Blended, Moisture Content Adjusted
- Shapes are Pressed
 - Any Shape Possible, as long as it can be pressed
- **“Green”** Brixx are Steam Cured in Autoclave for 6 hours
- Removed from Autoclave with “Full” Properties and Ready for Delivery

Advantages of Brixx Process

- Brixx made up of 90% recycled materials
 - Fly Ash and Bottom Ash (Power Plant Waste Product)
 - **Iron Oxide for Pigment (Potentially AMD Sludge)**
 - 100% Recycled Product when using Recycled Lime Products
- Can Utilize Fly Ash with LOI > 3%
- Uses less Energy than Clay Brick Production
- Releases Fewer Emissions than Clay Brick Production
- Exhibit strengths similar to or better than commercially available pavers
- Scrap Brixx can be Recycled and Reused in Process
- Modular Production Results in Uniform Sizes
- Can be Stained or Coated

PMET Bench-Scale Brixx



PMET Brixx Pilot Plant



Technology Demonstration: PA DEP Harvest Grant

On February 5, 2004, PMET was awarded the First Pennsylvania DEP Harvest Grant to Demonstrate its Brixx Technology on a Commercial Scale in its Brixx Pilot Plant

Harvest Grant Results

- Successfully Produced 3000+ Brixx Pavers (4" x 8" x 2 1/4") for use in Local Sidewalk Project to Demonstrate Process
- Demonstrated Properties of Commercial Size Brixx, meeting ASTM Physical Property Standards
- Mix optimized on Bench-Scale Translated to Full Size Brixx
- Demonstrated the use of Scrap in Subsequent Brixx Mixes for *Zero Waste Process*
- Tracked Energy Consumption for Scale-up

PA DEP Harvest Grant

Compressive Strength

Sample	Compressive Strength (Average of 5)
Commercially Available Paver 1	5400 psi
Commercially Available Paver 2	5540 psi
PMET Brixx with 11% Lime	7120 psi
PMET Brixx with 12% Lime	8480 psi

Absorption

	With H40 Water Repellent
24-Hr Cold Water Absorption	2.3%
5-Hr Boiling Water Absorption	8.3%
Saturation Coefficient	0.27

Scale-Up

Projected Energy Requirements

Source	Energy Requirement (kW*hr/ton)	Energy Ratio of Cited Plant : PMET Brixx Plant
PMET 13.5 million Piece Brixx Plant	123	-
PMET Brixx Pilot Plant	461	3.7 : 1
Roller Kilns (European Union Study)	416	3.4 : 1
Low Thermal Mass (NICE ³ Study)	1,278	10.4 : 1

Business Plan

- PMET seeking Strategic Partner to Commercialize the Brixx Process in Joint Venture
 - License US Patent # 6,068,803 to J.V.
 - PMET will Offer Technical Support/Direction
- Joint Venture Partner(s) will:
 - Construct, Operate, and/or Distribute Brixx
 - Willing to Invest in New Product/Process
- Potential Partners:
 - Power Plants (Ash Producers) - on-site would be ideal
 - Refractory Brick Producers (similar Equipment)
 - Structural Brick Producers
 - Have marketing and distribution Infrastructure

Business Plan

- Raw Material Supplies
 - More than 50 million tons of Fly Ash Available in U.S.
 - Use Fly Ash Not Currently Used in Concrete
 - Concrete Admixture Selling for More Than \$35/ton
 - DEP
 - Approximately 5,000 tons of Fe in AMD sludge from PA alone
 - Process must be Robust as Properties and Availability of Raw Material Properties Continuously Change
 - Establish Multiple Sources of Qualified Material
 - Should be Available at Reasonable Cost

Business Plan

- Distribution Issues
 - Can Ship Immediately After Cooling
 - Seeking Partner with Distribution Network
 - Brixx Stacked on Pallet and Banded
- Brick Market (per BIA)
 - 8.1 Billion Sold in 2002
 - \$1.7 Billion in Revenue for Manufacturers
 - Average Price of \$0.209 per piece F.O.B.

Business Plan

- Product Certification
 - Must Meet ASTM Standards for Pavers and Face Brick
 - Compressive Strength
 - Freeze/Thaw and/or Absorption
- Marketing / Customer Perception
 - Biggest Breakthrough Will Be Demonstration Project (Actual Application of Product)
 - Market as “Green” Product
 - Less Energy to Produce
 - Less CO₂ to Produce
 - Utilizing Recycle Materials
 - Must be Cost Competitive

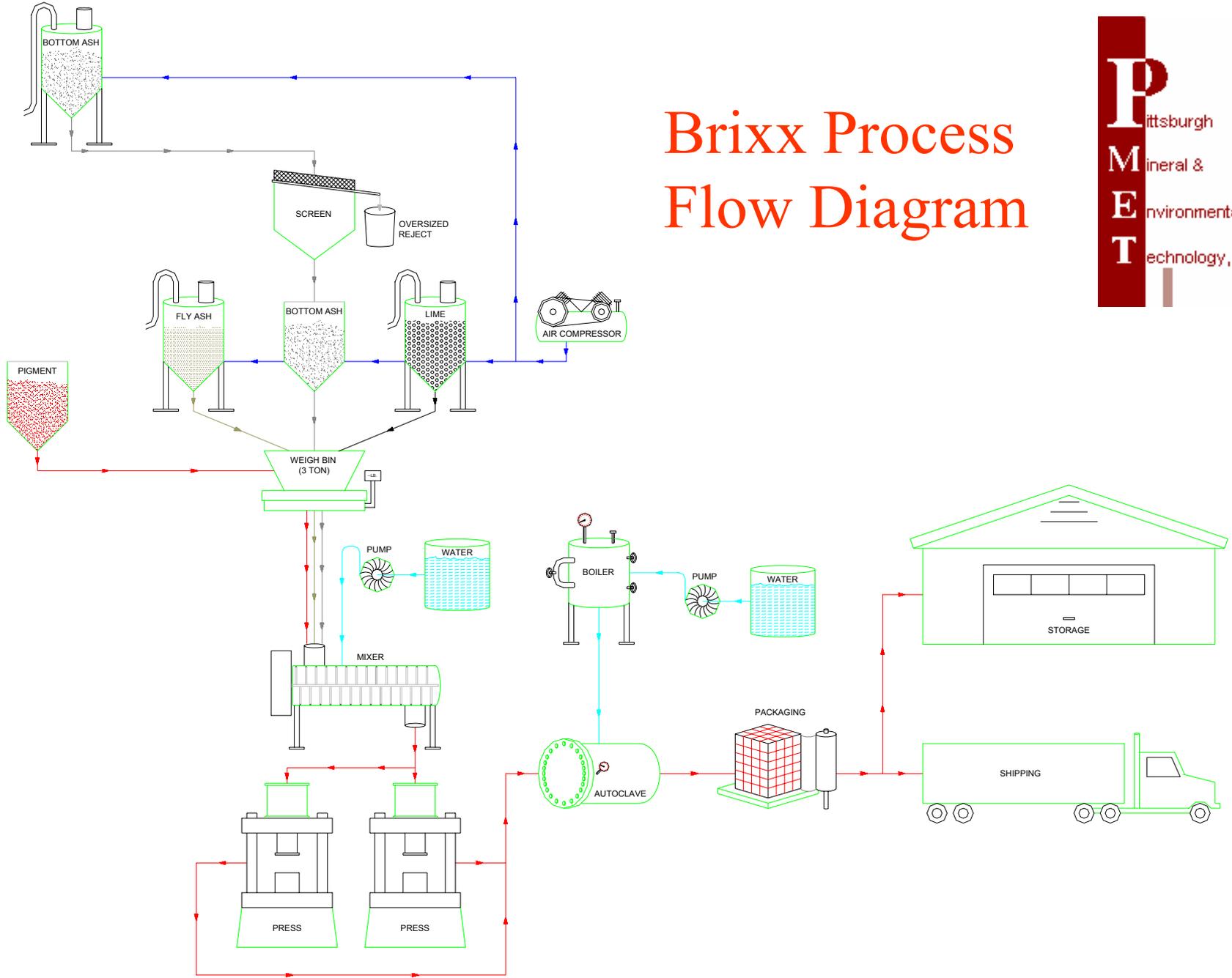
Brixx Economic Model

- Plant sized at Small Brick Plant Size
 - 13.6 million Brixx per year (0.17% of market)
 - Utilize 31,000 tons per year of Fly/Bottom Ash
 - Utilize 1,850 tons of Pigment per Year
- Pavers at Local Home Improvement Store
Sell at $> \$0.50$ / Piece
- Operating Costs at $\$0.103$ / Piece
- Capital Expenditures Cost at $\$2.2$ million

Brixx Economic Model

All \$ in 1000's	Monthly	Annually
Production (millions)	1.13	13.6
Revenue (\$0.25 / Brixx)	\$283	\$3,397
Direct Expenses (\$0.103 / Brixx)	\$177	\$1,399
Overhead	\$22	\$264
EBITDA	\$144	\$1,733
Return on Capital for Investor		
Capital Investment/Investor Share	\$2,203	50%
NPV / IRR over 10 years	\$5,330	33%

Brixx Process Flow Diagram



Working with Partner

PMET provides:

- Technology
- Mix Designs
- Equipment Set-up / Start-up
- Technical Support

Partner(s) Provide:

- Capital for Plant (\$2.2 million)
- Operating Capital
- Operation Management
- Distribution

Profits Distributed per Joint Venture Agreement

Pursuit of Partner

- **PMET Still seeking other partners:**
 - Current Brick Producers
 - Refractory Brick Producers
 - Power Plants
 - AMD Producers?