

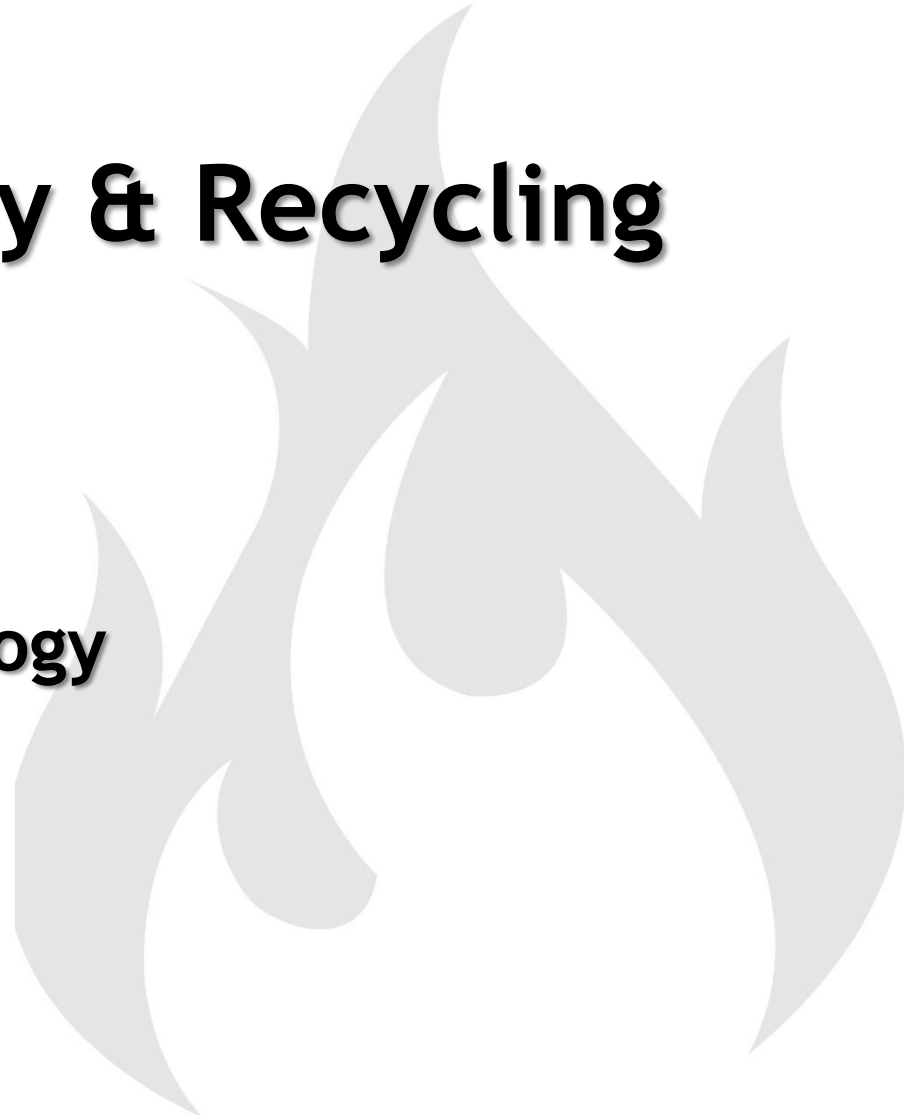


BALCONES
FUEL TECHNOLOGY

Naturally Inspired Thinking

Sustainability - Energy Recovery & Recycling

Randy Wolf
Balcones Fuel Technology
July 28, 2012





BALCONES
FUEL TECHNOLOGY

Naturally Inspired Thinking

Overview

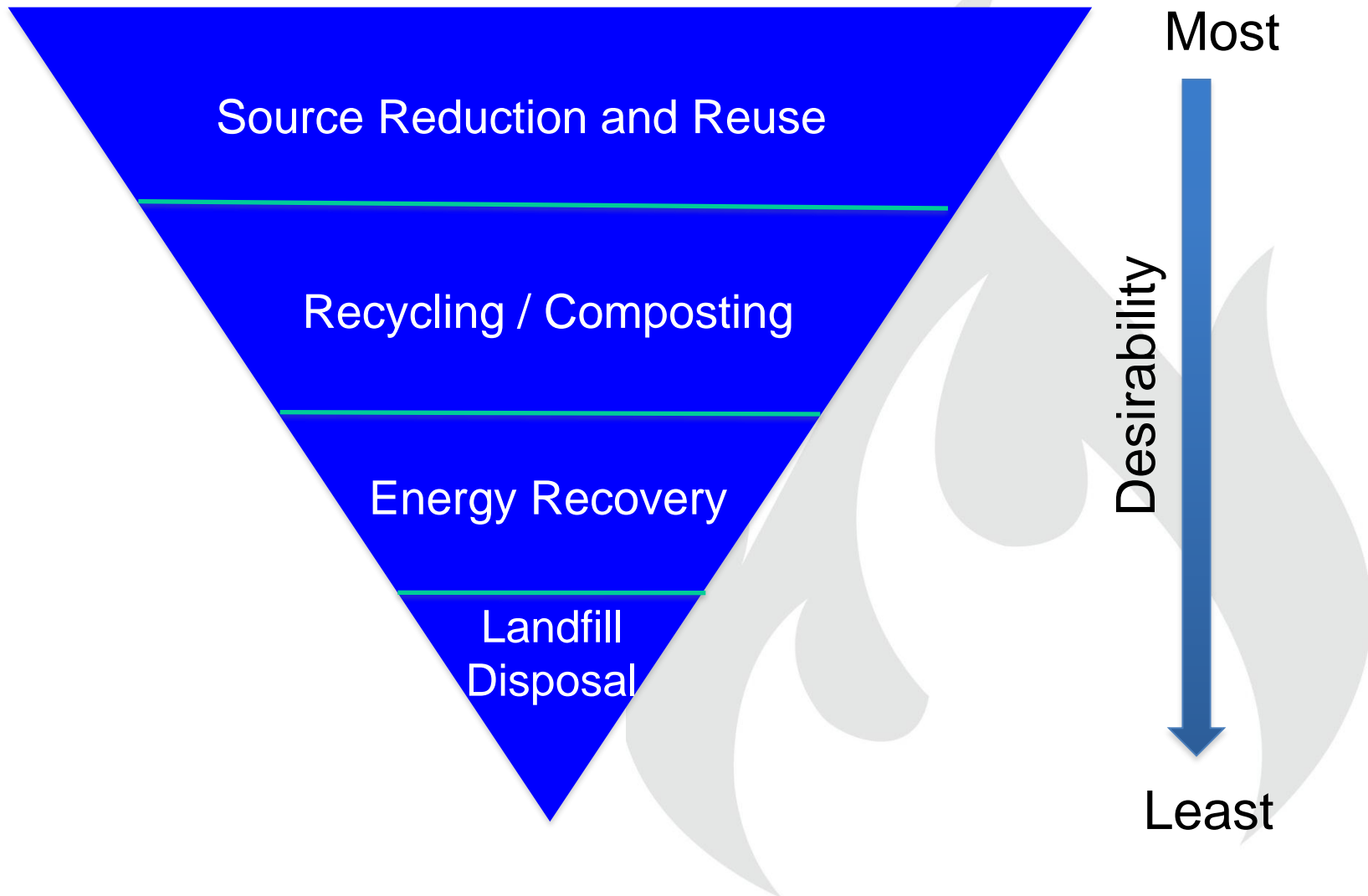
- Recycling
- Balcones Fuel Technology
- Waste Stream is Changing
- Why Energy Recovery
- Project w/ ACC and Blue River Resources
- What Can You do In Your States



BALCONES
FUEL TECHNOLOGY

Naturally Inspired Thinking

EPA's Hierarchy





BALCONES
FUEL TECHNOLOGY

Naturally Inspired Thinking

Our Principles

- Waste is the residual from expanded recycling efforts.
- Recycling Code = squeeze the most value from each ton of material.
- Waste itself has a hierarchy of value
- “Value” is determined by “cost” required to convert to something useful.



BALCONES
FUEL TECHNOLOGY

Naturally Inspired Thinking

Garbology 101

- Best - post industrial waste, TDF
 - Better - post residential MRF residue
 - Good - ag-waste, sludge, bio-solids
 - Challenging - MSW, haz-waste
- *Moisture, ash, BTU value, contamination, location, disposal options and costs*



BALCONES
FUEL TECHNOLOGY

Naturally Inspired Thinking

Fuel Technology

- Division of Balcones Resources
- Operate 3 Recycling Plants and 2 shredding plants
 - Dallas, Austin, and Little Rock
- Largest Independent Waste Paper Supplier in Southwest
- Balcones does NOT own a Landfill



BALCONES
FUEL TECHNOLOGY

Naturally Inspired Thinking





BALCONES
FUEL TECHNOLOGY

Naturally Inspired Thinking



Kimberly-Clark

- Kimberly-Clark “Vision 2000”
- KC Manufacturing Plants to be “landfill free”
- Balcones handles all to the post-industrial waste from 4 production facilities (diapers, baby-wipes and fem care)
- KC formed the basis for our Alternative fuel business



BALCONES
FUEL TECHNOLOGY

Naturally Inspired Thinking

Fuel Customer?

- Paper mills consume huge amounts of bio-mass
- A fuel cube is identical to a wood chip in size and configuration
- Handled with existing boiler feed systems
- BTU value 2.5+ times the value of wood



Finished fuel cubes



BALCONES
FUEL TECHNOLOGY

Naturally Inspired Thinking

- A large mill can consume 120 truckloads of wood per day
- Natural gas used as a supplement - especially when the wood is wet.



BALCONES FUEL TECHNOLOGY



BALCONES FUEL TECHNOLOGY



BALCONES FUEL TECHNOLOGY

Today

- Kimberly-Clark
- 3M
- PepsiCo/Frito-Lay
- Toyota
- Wal-Mart
- Proctor & Gamble

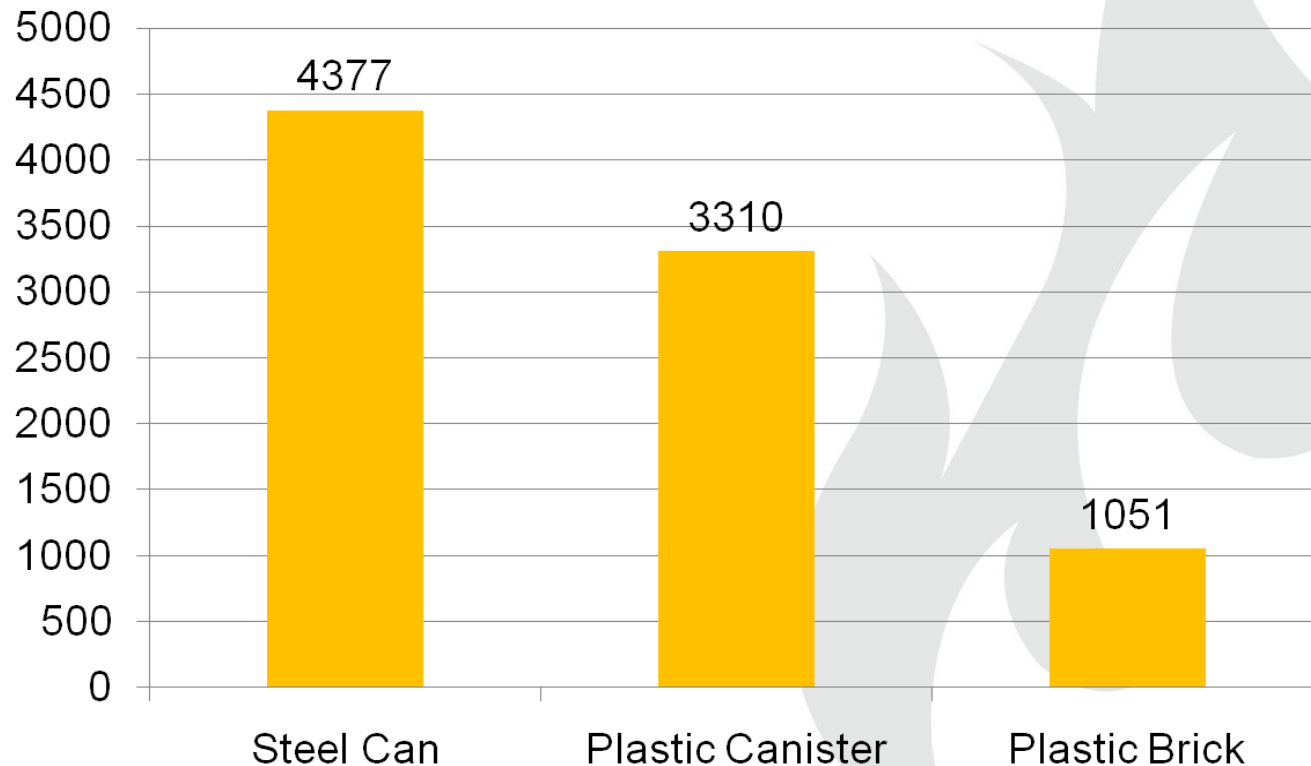
Non-Recyclable Industrial Co-Products

Zero Waste – Zero Landfill Initiatives

Our Changing Waste Stream



Greenhouse gas





What to do with Multi-Layer, Multi-Polymer Pouch?

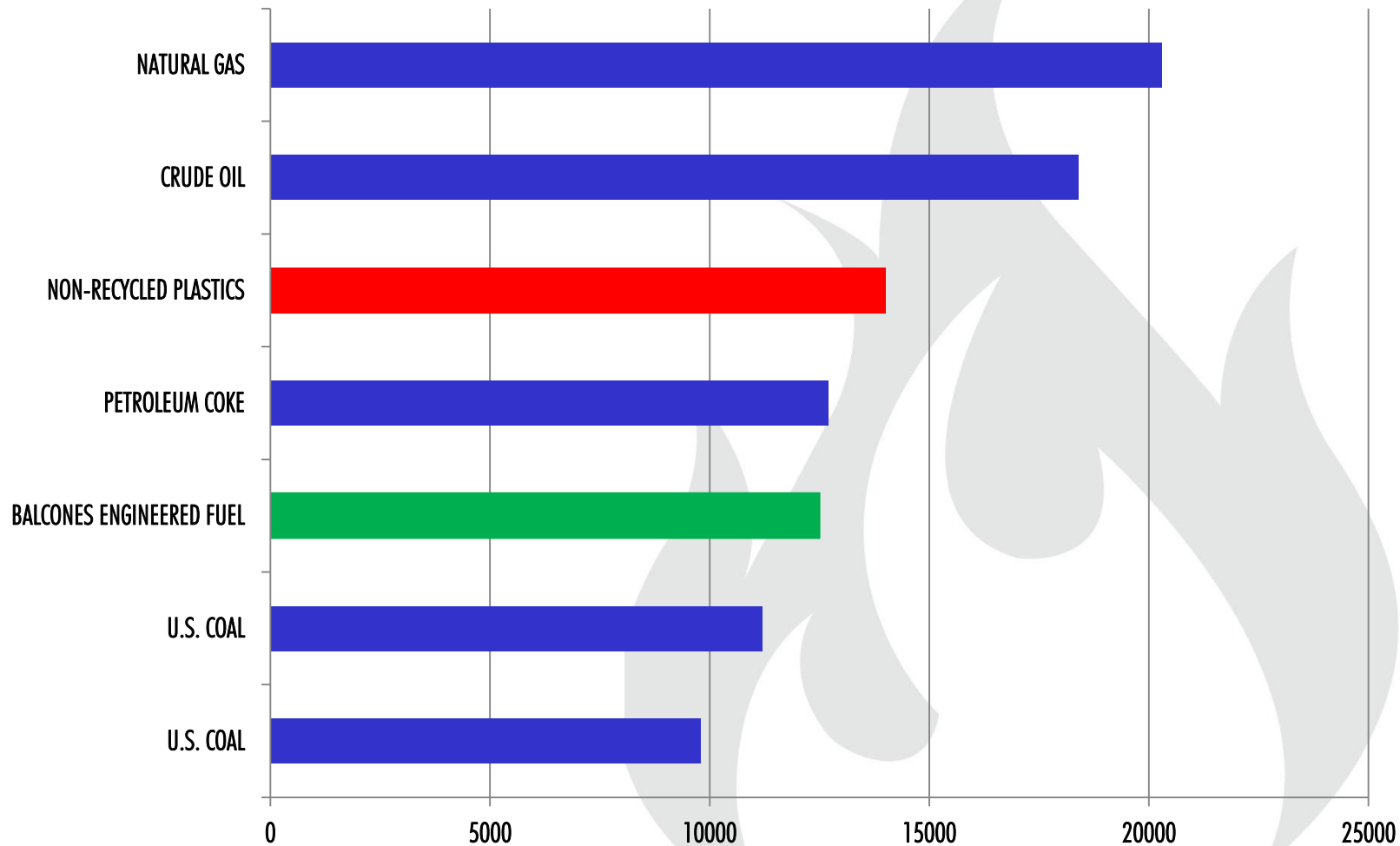
- Rapid Market Growth
- Huge environmental impact versus glass jars:
 - Landfill volume - 95% ↓
 - GHG - 93% ↓
 - Energy Usage - 87% ↓
- Yet, multi-layer, flexible packaging means “very difficult” to recycle economically



BALCONES
FUEL TECHNOLOGY

Naturally Inspired Thinking

Energy Value Comparison





BALCONES
FUEL TECHNOLOGY

Naturally Inspired Thinking

Lots of Energy in our Waste



- If 100% of landfilled MSW was recovered for energy could power 16.4 million homes a year.
- Put another way if all waste was recovered - enough power to meet 5% of total U.S. energy consumption.



BALCONES
FUEL TECHNOLOGY

Naturally Inspired Thinking

Value of High BTU Plastics

- The equivalent of 807 Trillion BTUs of energy
- If converted to fuel could power 6 million cars for a year
- Enough to supply energy to 5.2 million households.





BALCONES
FUEL TECHNOLOGY

Naturally Inspired Thinking

Strategic Partnerships

- Partnered with ACC; Blue River Resources, Colgate Paper Stock, and TXI Cement.
- Sourced 80 tons of landfill bound MRF residue.
- Produced 130 tons of Balcones Engineered Fuel:
 - 60 / 40 Plastics to Paper
 - 60 / 40 MRF Residue to Post-Industrial Feedstock
- Met Fuel Spec for use in Kiln
- Independent test showed heating value of 12,500 BTUs/lb
- Replaced coal - 1 ton/hour for 24 hrs, 2 tons/hr for 48 hours.



BALCONES
FUEL TECHNOLOGY

Naturally Inspired Thinking

Findings & Results

- Independent Analysis provided by University of Texas Researchers - Webber Energy Group
- Our engineered fuel is more energy dense than most forms of coal and petroleum coke.
- Using engineered fuel at kiln significantly offsets the production/transportation energy used.
- Emissions are reduced over the lifecycle compared to alternatives like coal
 - SO₂ Emissions by 19% - 44%
 - CO₂ Emission by 1.5%
- Over its life cycle, just capturing 5% of MRF residue for energy could result in CO₂ reductions equivalent to removing 1 million cars from the road.



BALCONES
FUEL TECHNOLOGY

Naturally Inspired Thinking

Where Are We Headed

Current Opportunities

- Co-fire with coal in power boilers and kilns.
- Designing MRFs to produce fuel.
- Working with ACC and others to maximize recycling and recovery.

Future Opportunities

- Gasification technology
- Pyrolysis - i.e. Plastics to Oil/Fuels
- Fuel Cubes as an intermediate step to higher value fuels and chemicals.



BALCONES
FUEL TECHNOLOGY

Naturally Inspired Thinking

Recommendations

- Adopt a “resource management” approach.
 - Based on an advanced EPA hierarchy
- Broaden the definition of ‘Renewable’ and ‘Clean’
 - To include all MSW and emerging conversion technologies
- Level the Playing Field
 - Support development and use of ALL renewable options
- Simplify Permitting Process - Encourage Innovation
 - Define high energy MSW as a ‘fuel’ not a ‘waste’
- Recognize energy recovery as ‘diversion’ not disposal.
- Include Energy Recovery in future state energy planning



BALCONES
FUEL TECHNOLOGY

Naturally Inspired Thinking

Sustainability - Energy Recovery & Recycling

Randy Wolf
Balcones Fuel Technology
July 28, 2012

