Mixed Alcohol

A Key Component to Our Energy Future

October, 2015

Standard Alcohol

Introduction

Standard Alcohol is an Intellectual Property (IP) licensing and holding company, focused on clean, alternative fuels and specialty chemical technologies, based in Denver, Colorado.

- Standard Alcohol has created a proprietary modern adaptation of a century-old and successful thermo-chemical catalytic process
- Transforms abundant, carbon-rich feedstock (natural gas, coal, biomass) into a blend of ten "higher" alcohols (Mixed Alcohols)
  - Capable of using CO2 as a partial feedstock with Natural Gas and Coal (up to 33%)
- Outperforms existing oxygenated fuels, such as crop-based ethanol and prospective cellulosic ethanol fuels
- More cost-effective to produce (~$1/gal)
- 20% to 50% lower carbon footprint than Corn Ethanol

based on 2014 Argonne National Labs/DOE GREET Study

Mixed Alcohol Value Proposition

Easy Substitution
- EPA Approved
- Drop-in Replacement for Ethanol in the Fuel Supply
- Easier on Engines

Environmentally Responsible
- 50% Lower CO/CO2 Emissions Profile than Ethanol
- Biodegradable & Not Crop-Derived
- Net Consumer of CO2
- Nominal Water Required

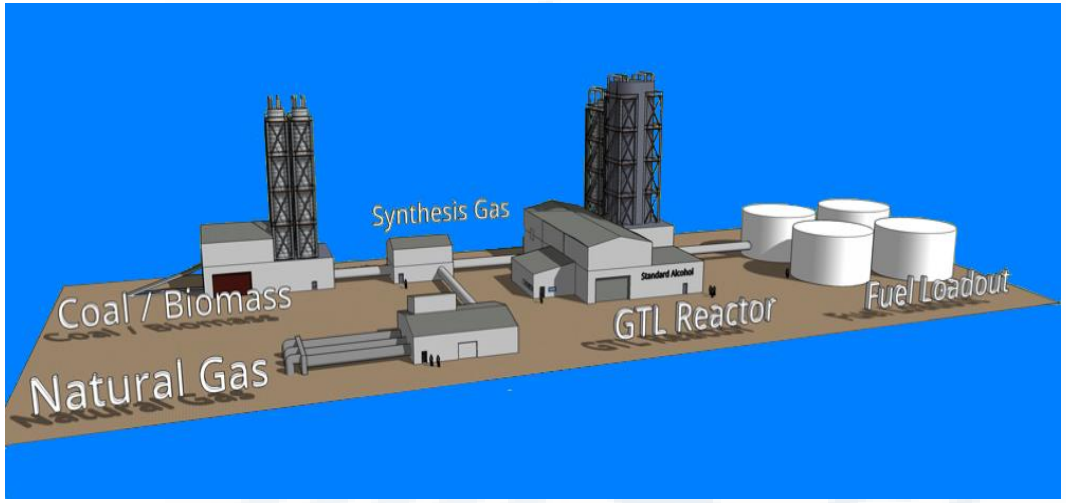
Standard Alcohol's Mixed Alcohol Fuel Technology

Superior Performance
- 120 Octane
- 98,000 Btu
- Low Blending RVP
- Better lubricity than Ethanol (less engine wear & tear)

Low Production Costs
- Greater production efficiencies
<$1 to produce a gallon (@ $4/mscf gas)

Flexible Paradigm
- Uses Natural Gas, or any carbonaceous material
- Field Deployable to Refinery/ Plant-ship Scale

Advanced Technology



Closed loop, thermo-chemical GTL:

- ✓ Modern adaptation of 80 year old GTL process
- ✓ Nominal water needs
- ✓ No smokestack
- ✓ No fluid waste stream

Highly Efficient "Exothermic" Process:

- ✓ Uses excess heat to power itself
- ✓ ~1.8 gas recycle loops to fully react SynGas
- ✓ Requires 33-50% less CapEx than Fischer-Tropsch
- ✓ 28% more efficient conversion than Fischer-Tropsch
- ✓ The most efficient GTL process in the market!

Feedstock flexibility:

- ✓ Natural Gas*
- ✓ Coal*
- ✓ BioMass / Biosolids (if/when economical)

*CO_2 can be used as a feedstock extender (up to 33%)

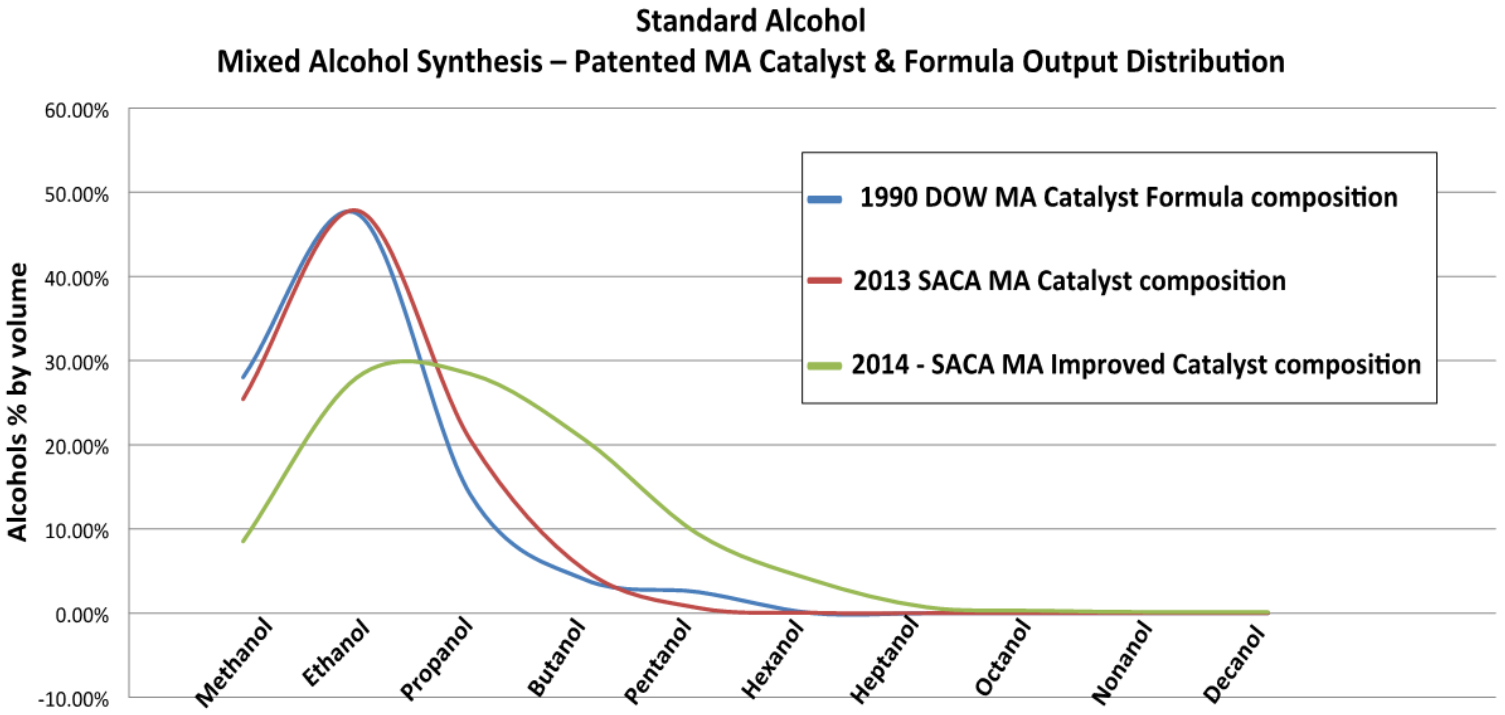
Proprietary Catalysts:

- ✓ 25+ years of cumulative R&D
- ✓ Highly optimized & evolved
- ✓ Multi-national, 3rd party manufactured
- ✓ Patent pending formulations
- ✓ Sulfur (sour gas) tolerant

Scalable :

Catalyst Evolution

The chart below illustrates the evolution in Mixed Alcohol Synthesis. Standard Alcohol has built upon the DOW results (comprised primarily of the less-desired lower-chain alcohols) to create a patented blend of Btu-rich higher-chain alcohols.



Standard Alcohol's Mixed Alcohol Fuel Profile

The Mixed Alcohol fuel produced from Standard Alcohol's proprietary process contains the following characteristics:

- Blending Octane = 120 (vs. 104 for ethanol)
- BTU content = 98,000 Btu/gallon (vs. 74,000 for ethanol)
- Blending RVP lower than ethanol
- 50% better CO and CO2 emissions profile (vs. ethanol oxygenated gasoline)
- 10% greater fossil fuel energy use when gasoline is blended with Mixed Alcohols (vs. ethanol)
- Lubricity superior to ethanol (lower engine wear & tear)
- Fully biodegradable
- Holds EPA registration approval as an Oxygenate Additive in gasoline and diesel
- Fuel Enhancer – when blended with low grade fuels makes Mixed Alcohol desirable for refiners

Contact Information

Standard Alcohol
495 Uinta Way, Suite 210
Denver, Colorado 80230
(303) 500-0954

Robert C. Mulverhill
Executive Chairman of the Board
bob.mulverhill@standardalcohol.com
Mobile: +1 303.884.1157

Michael E. Pardun
Chief Executive Officer
mike.pardun@standardalcohol.com
Mobile: +1 303.667.0731