



**ENSYN**

**IDEA2014**

**Advanced Cellulosic Biofuel  
Industrial & Commercial Heating**



# Community Energy – Goals & Aspirations

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- Reduce and/or stabilize costs
- Improve GHC footprint as part of sustainability goals (i.e., President's Climate Commitment, etc.)
- 100% Reliability
- Preference for baseload resources (i.e., natural gas, oil, etc.)

# Alternatives & Options

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***Biofuels***



***Natural Gas***



***Fuel Oil***



***LNG/CNG***



***Solid Biomass***



# Ensyn's RFO Option

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- Ensyn's renewable liquid heating fuel is RFO™
- RFO is essentially a “liquid wood”
  - ▶ A homogeneous, organic liquid obtained from the thermal conversion of biomass
  - ▶ Appearance of motor oil, pourable at room temperatures
- RFO can be co-fired or used alone in conventional commercial and industrial boilers
  - ▶ No need to retrofit boiler
  - ▶ Burners available from Cleaver Brooks, Oilon



# Environmental Considerations

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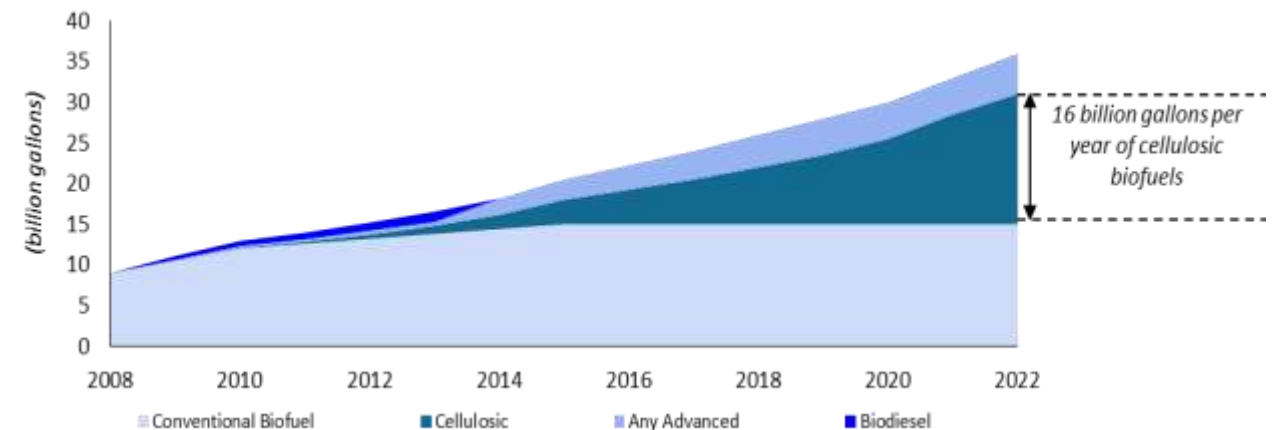
- Emissions compare favorably with fossil fuels
- Negligible sulphur and metals

Emission Factor lb/MMBtu (HHV)	NG	ULSD	Distillate	No.4	No.5	No.6 (low S)	No.6 (high S)	RFO
CO	0.082	0.036	0.036	0.033	0.033	0.033	0.033	0.028
NOx (Expressed as NO2)	0.098	0.14	0.14	0.13	0.37	0.37	0.37	0.28
SO2	0.0006	0.0015	0.22	1.35	1.97	0.88	4.16	0.009
Total PM	0.0075	0.014	0.014	0.047	0.067	0.073	0.26	0.053
VOC (Expressed as NMTOC)	0.0054	0.0014	0.0014	0.0013	0.0019	0.0019	0.0019	0.00023

- Eligible under RFS2 and other significant regulatory programs

# Regulatory Benefits

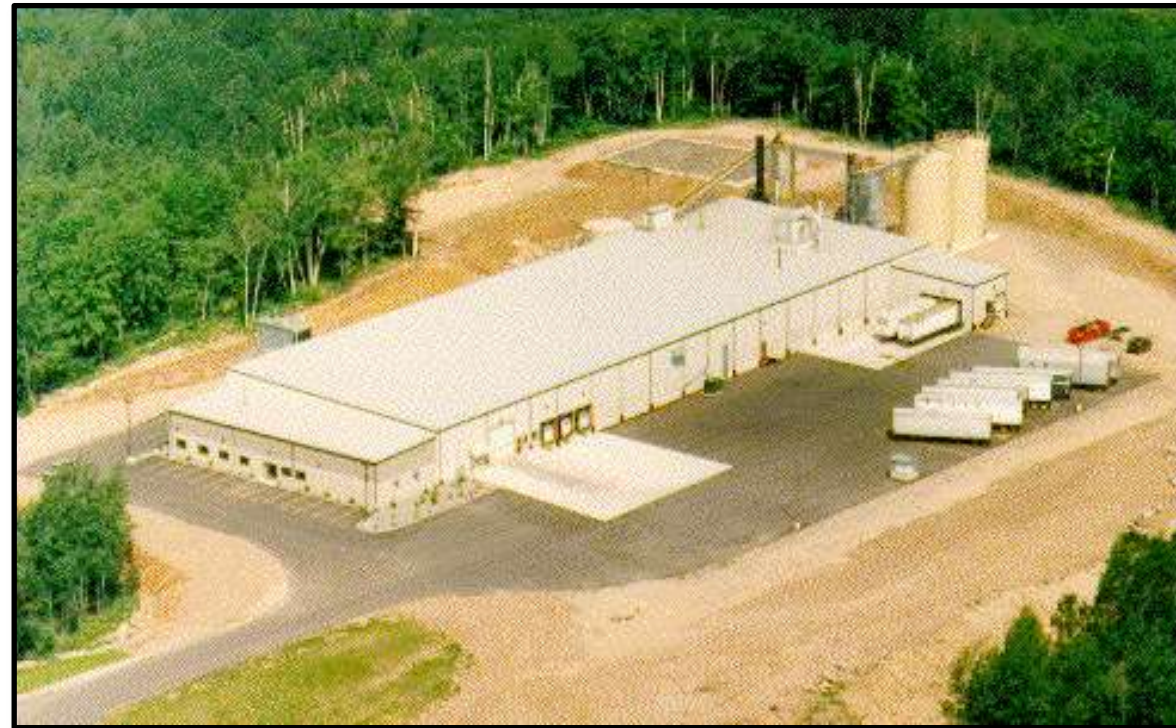
- Various significant regulatory benefits in place
- The US regulatory arena is key
  - ▶ Federal – RFS2
  - ▶ State – Low Carbon Fuel Standard, RECs
- RFS2 requires increasing volumes of renewable fuel – from 20 - 36 Billion gallons/year by 2022
  - ▶ All growth to come from Advanced Fuels – mostly from Cellulosic category
- Ensyn generated first heating oil RIN by anyone in March 2014



# Historical Commercial Experience

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- Over 25 years of combustion of RFO on an industrial scale
- Over 15 million gallons combusted
- Primarily in Rhineland, Wisconsin





# Ensyn's Renfrew Facility – Capacity Expansion

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- Enhancement underway to boost capacity to 3 million gpy
  - ▶ 24/7 operations
  - ▶ Primarily wood handling, drying, emissions, control, storage
  - ▶ To be completed by July, 2014
- Production is not being interrupted
- Five year renewable contract signed for 300,000 gpy of RFO to Memorial Hospital, New Hampshire for heating
- 1.7 million gallons earmarked for extended industrial heating trial in 2014-2105





# Youngstown Ohio

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- Demonstration carried out in early 2014
- Over 2600 gallons of RFO combusted
- No operational challenges
- RFS2 credits (RINs) generated
- First heating oil RIN generated in the US



# Memorial Hospital, North Conway New Hampshire

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- 5 Year renewable contract signed in March 2014
- 300,000 gallons/year of RFO
- Replacement of entire heavy fuel oil requirement
- CleaverBrooks installing a newly designed and fully tested RFO burner, applicable for fire tube package boilers



# Memorial Hospital

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# Cleaver-Brooks Alliance

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- Collaboration between Ensyn and Cleaver-Brooks to develop drop-in burner
  - ▶ Delivery equipment – Burner and control system
  - ▶ Seamless integration into existing liquid burning boilers
  - ▶ Market development
- Focus on package boilers- institutional and health care focus- RIN's for Heating Oil
- Memorial Hospital is initial project





# Additional Demonstrations

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# International Focus - Brazil



- Fibria Celulose S.A., (NYSE: FBR) is the world's largest market pulp producer
- Ensyn and Fibria have a 50/50 joint venture for the roll-out of RFO capacity in Brazil
- Fibria invested \$20 million for 6% of Ensyn equity in late 2012, has one Ensyn Board seat
- First project in Brazil announced – sited at Fibria's 2.3 million tpy pulp mill in Aracruz, Espirito Santo

***Aracruz Mill  
Espirito Santo, Brazil***





# Questions

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