



Advanced Biofuels and the Circular Economy

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FOCUS: VERY LOW CARBON FUELS (AND CHEMICALS) THAT CAN MAKE MONEY

Target Markets/Products

Raw Materials



Most carbohydrate-based raw material can work

Jet Fuel



Gasoline (Isooctane)



Oxygenated Blendstocks for Gasoline (Ethanol and Isobutanol)

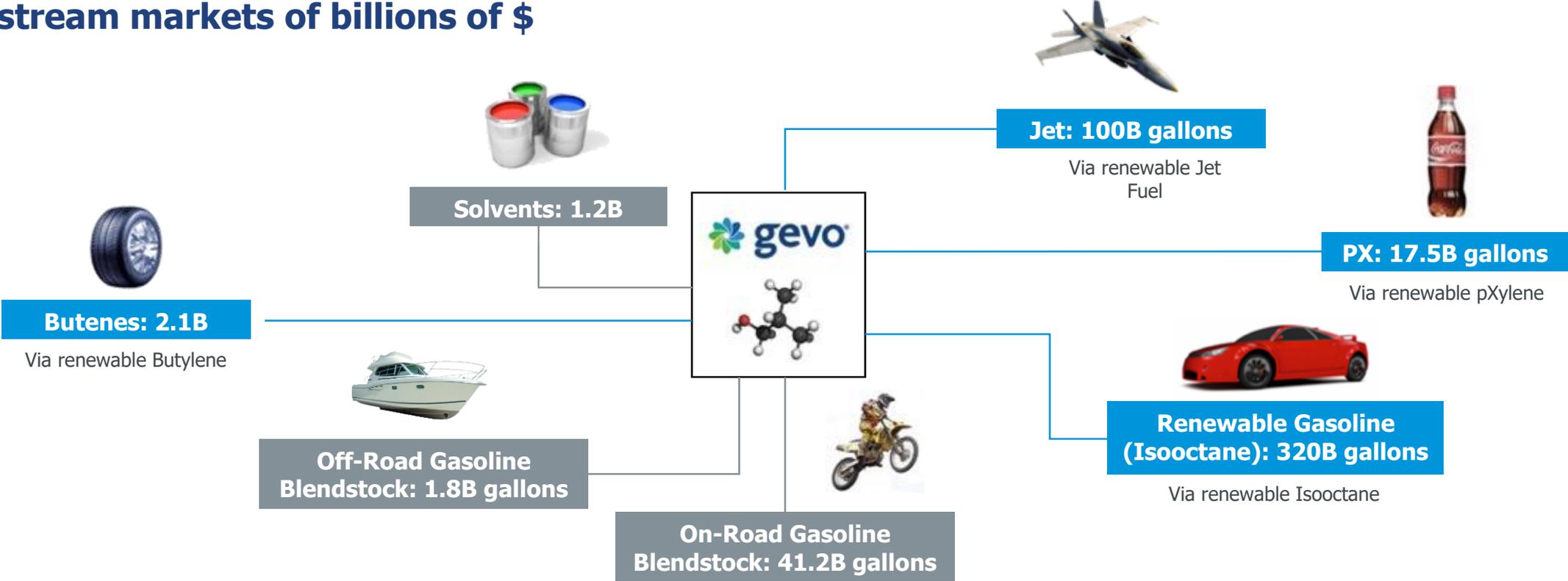


- Production technologies work
- Products work
- Markets are developing
- We are selling products
- We still need to achieve economies of scale

ENORMOUS MARKET POTENTIAL

Mainstream markets of billions of \$

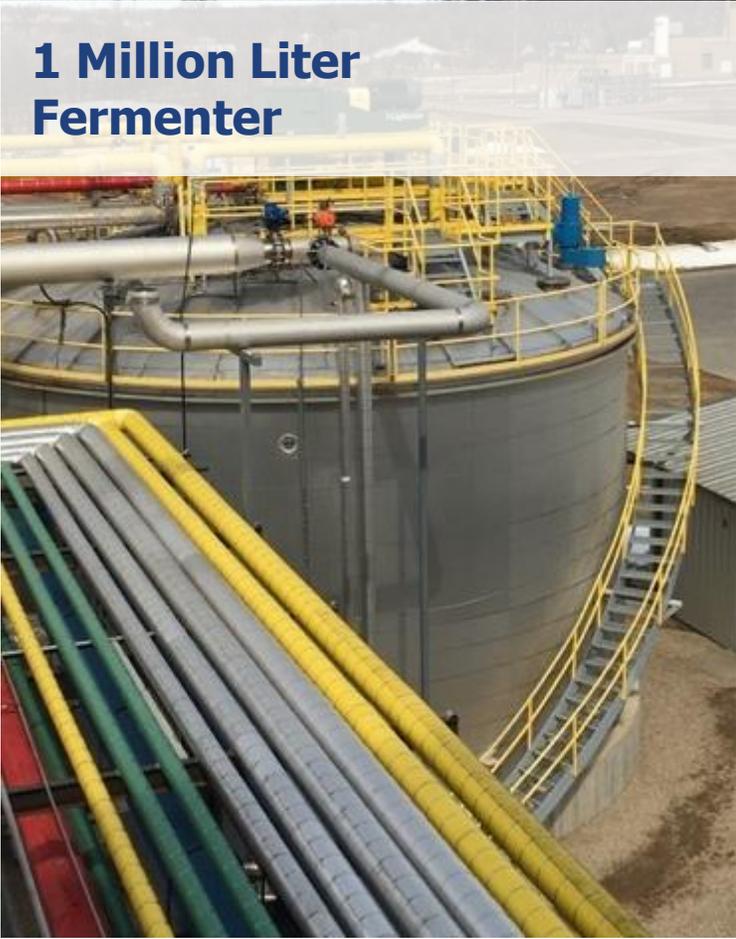
- Isobutanol (IBA)
- IBA-derived "Drop in" Hydrocarbons



Products work, and have potential to make money.

MAKING PRODUCTS

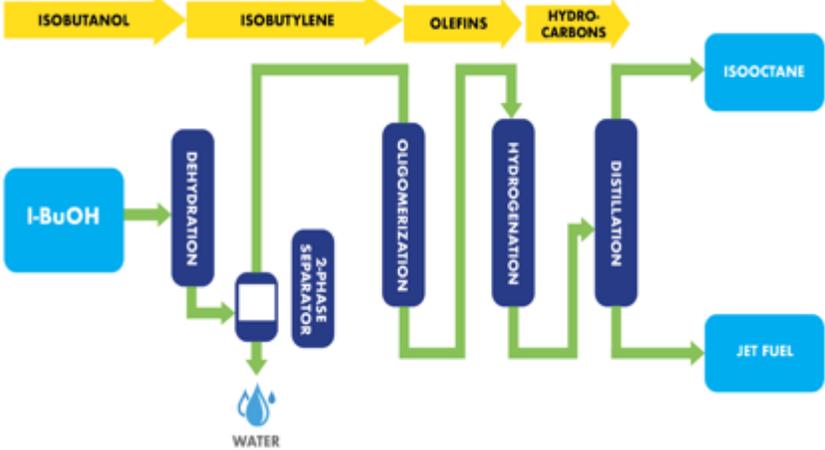
1 Million Liter Fermenter



Hydrocarbon Production* Silsbee, TX

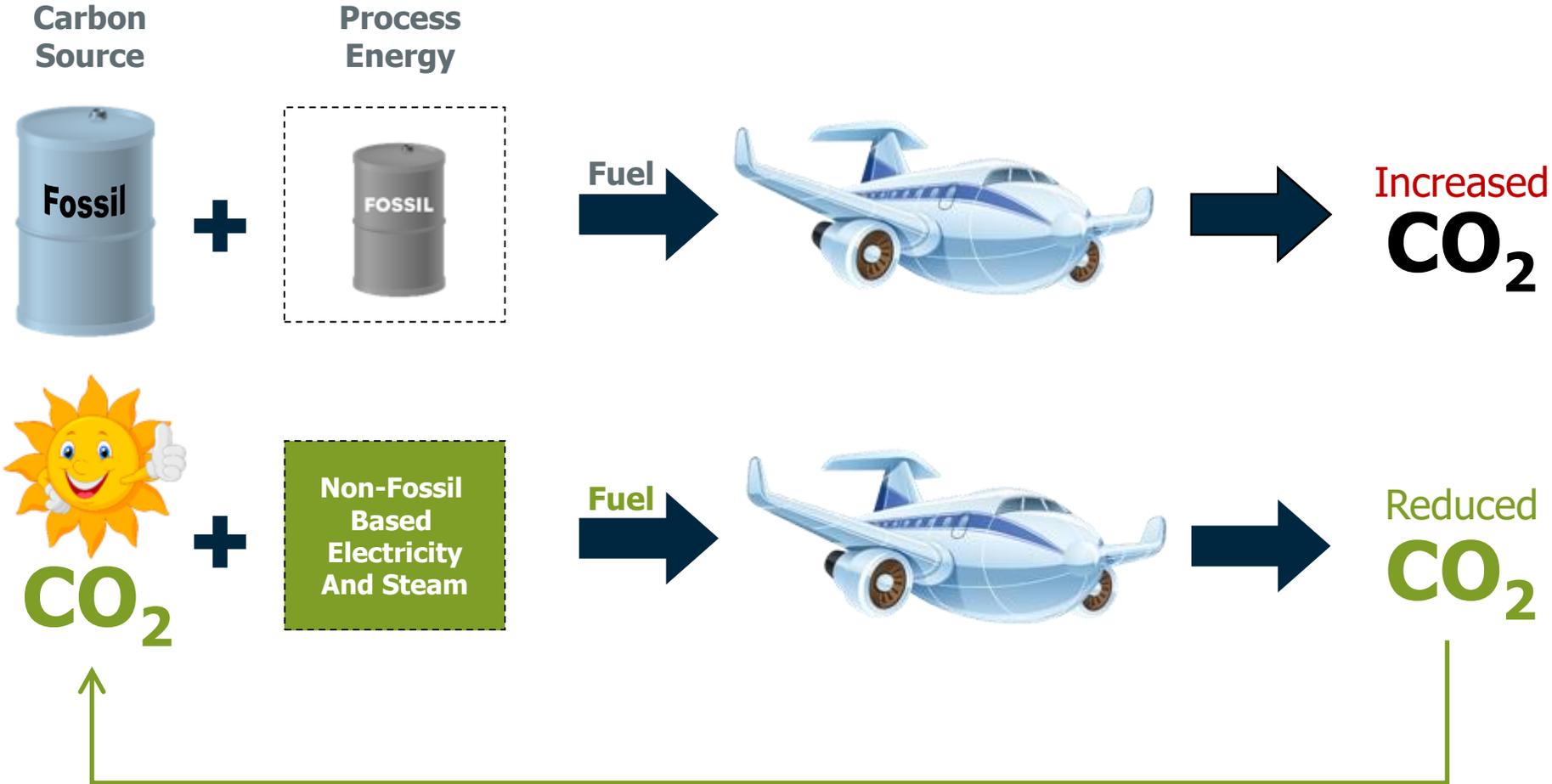


Ethanol and IBA Production - Luverne, MN

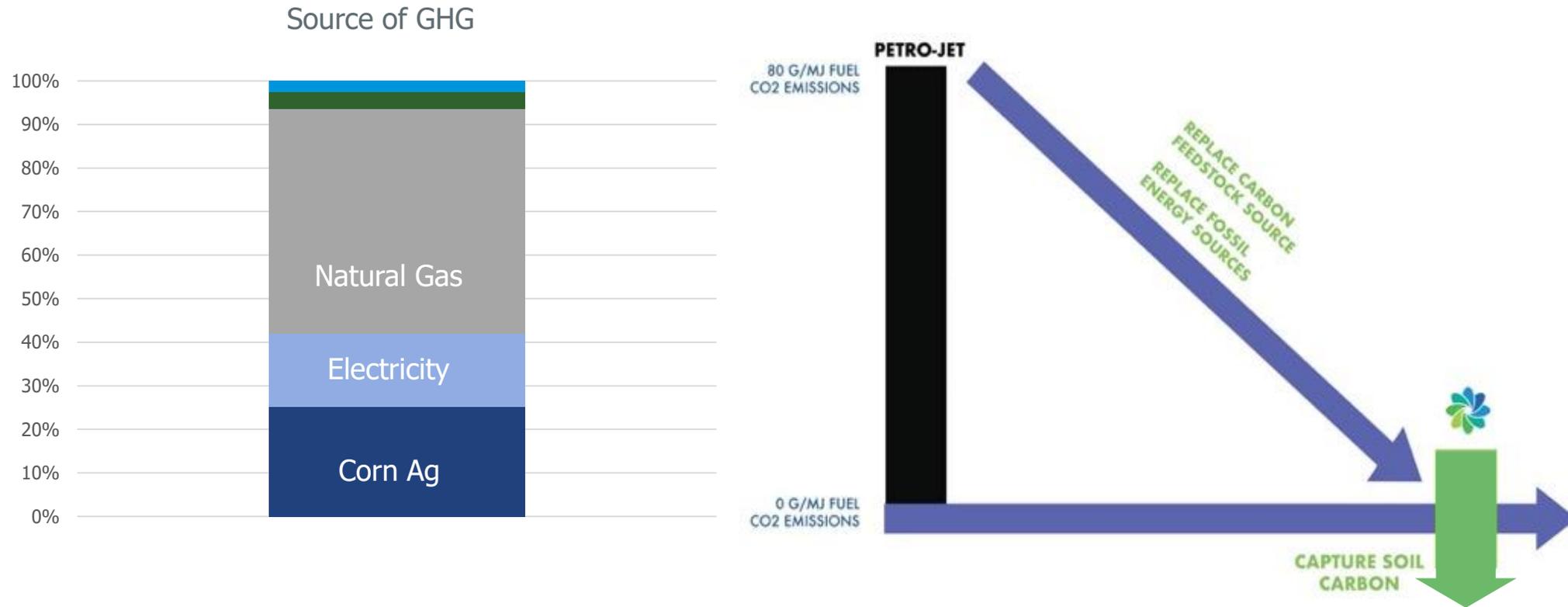


* Operated in Partnership with South Hampton Resources, Inc.

REPLACE THE **CARBON SOURCE** AND **ENERGY SOURCE** TO ELIMINATE GHG'S FROM FUELS AND GET TO **NET ZERO EMISSIONS**



WE CAN DRIVE JET FUEL TO VERY LOW CARBON FOOTPRINTS

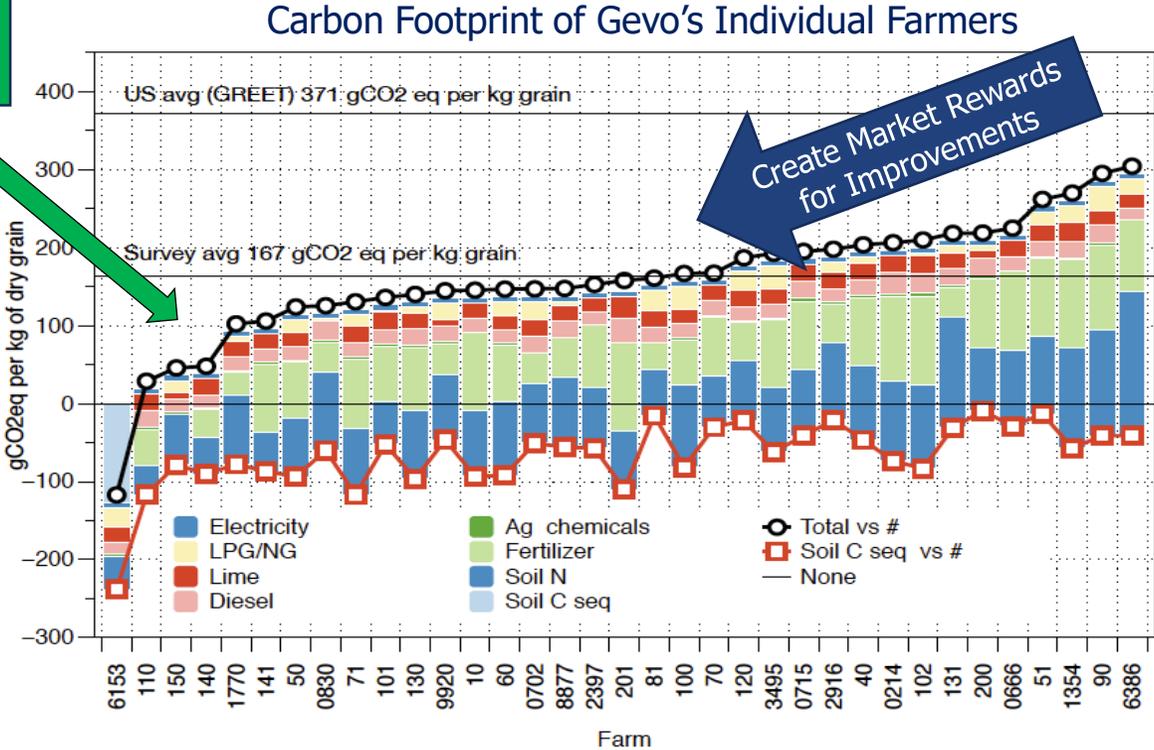


The carbon footprint has potential to be driven to negative with agricultural practices or with more renewable natural gas (RNG)

OUR FARMERS ARE VERY GOOD, AND WE CAN MAKE THEM BETTER

Measure, Improve, Reward

ISCC PLUS Certified Farm (49gCO₂e/kg)



- Already lower than the US average by 50%
 - Precision agriculture
 - Low till/no-till planting
 - Moving to manure based fertilizer
- Future upside potential

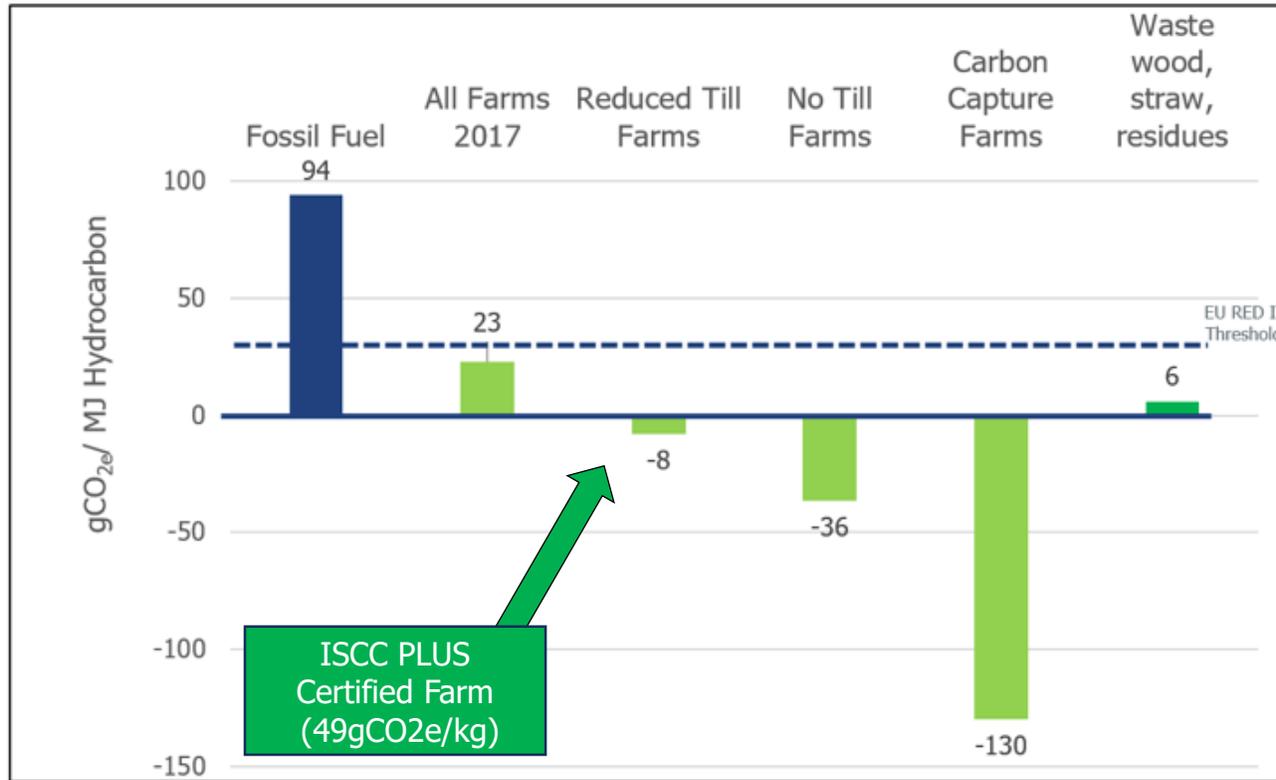
Rewarding farmers for improvement should lower the carbon footprint

STRIP TILLING BUILDS CARBON IN THE SOIL



JET FUEL: HOW TO DRIVE THE GHG FOOTPRINT DOWN AND EVEN NEGATIVE!

And produce protein too



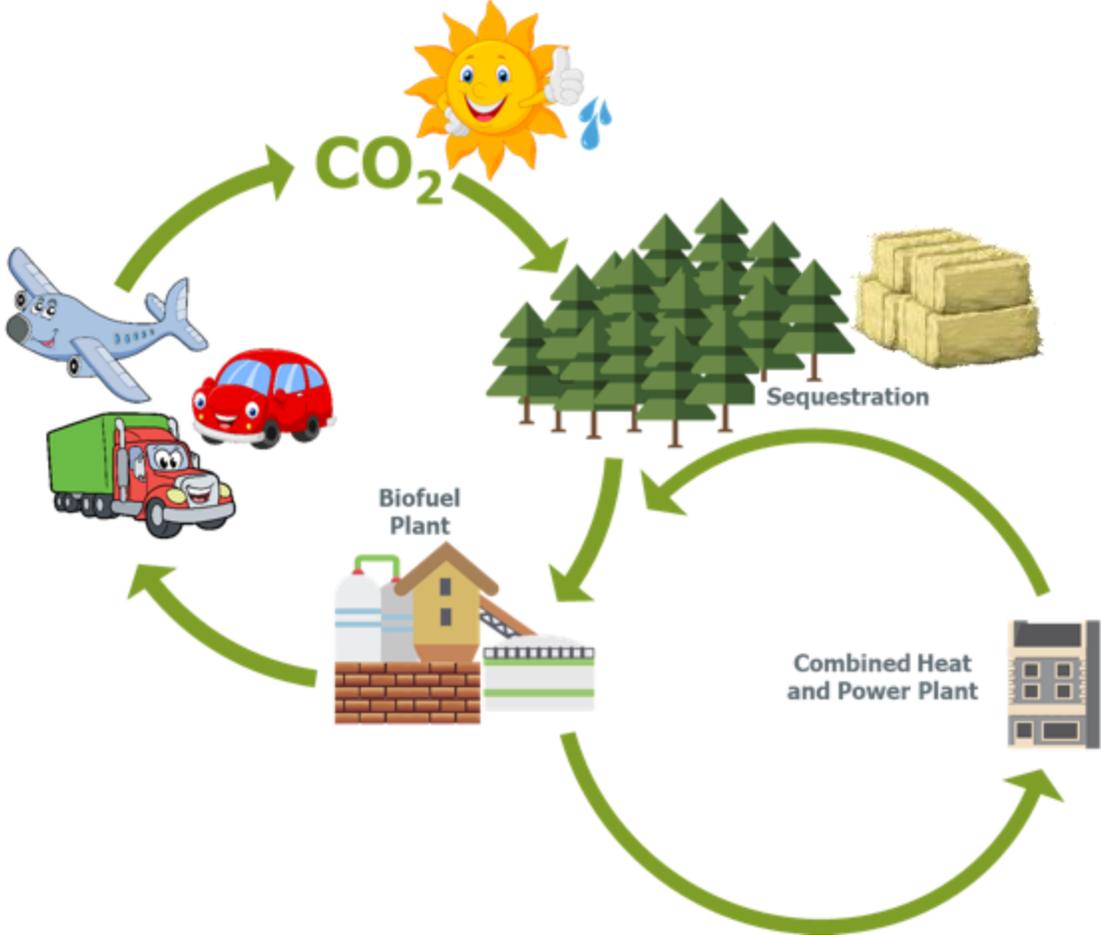
Agriculture improvements are practical and being done

- We fully expect to be able to meet RED II, RSB, and ISCC requirements
- Agricultural improvements can lead to sequestered carbon in the right systems
- Agricultural improvements frequently lead to higher yield and more protein

Companies such as Indigo, Farmers Business Network, and Locus, believe that soil carbon capture can be dramatically increased leading to orders of magnitude increase by building root systems. If true the amount of carbon capture per gallon could be in the 10's of kgs per gallon. We are working with these companies to figure it out.

CELLULOSIC FEEDSTOCKS ARE ENABLED

Enables Potential Global Scale



Cane, Molasses, Bagasse, Rice Straw, Wheat Straw, Corn Stover



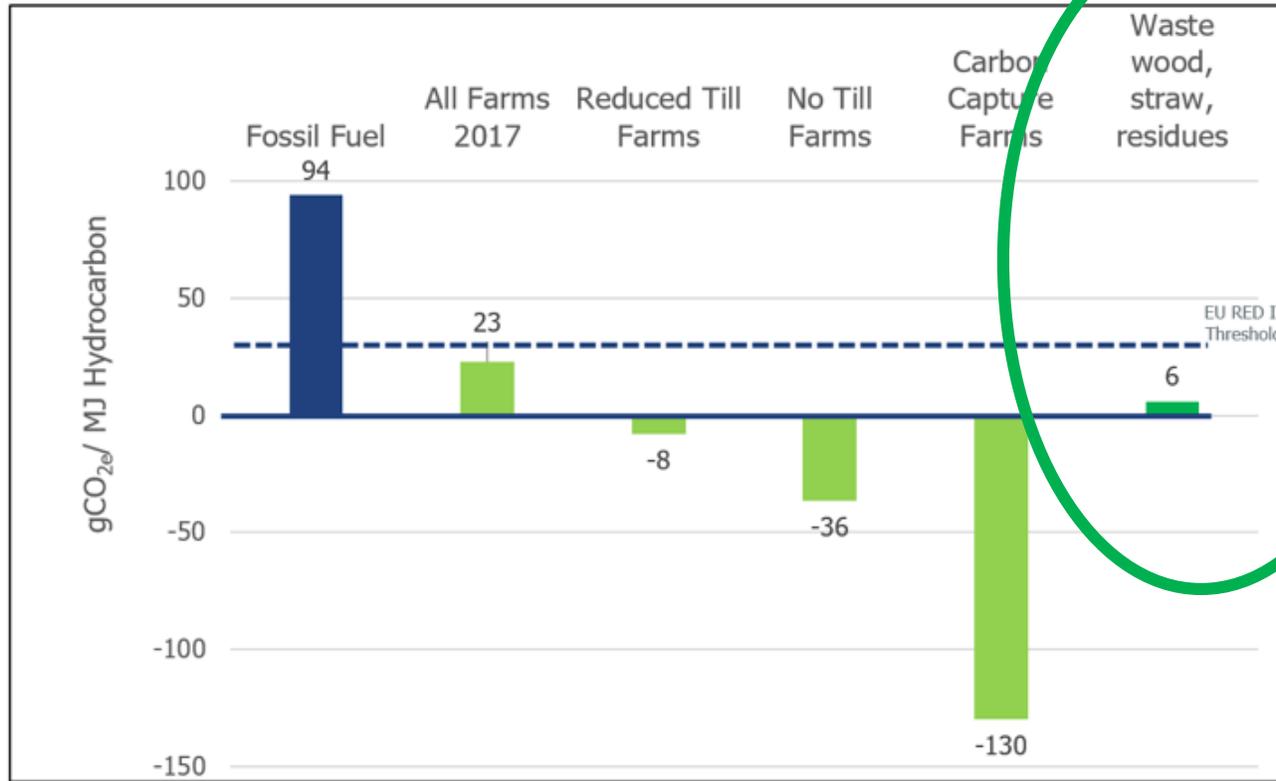
Wood, Forestry Residues, Slash, Stover



LEAF
RESOURCES

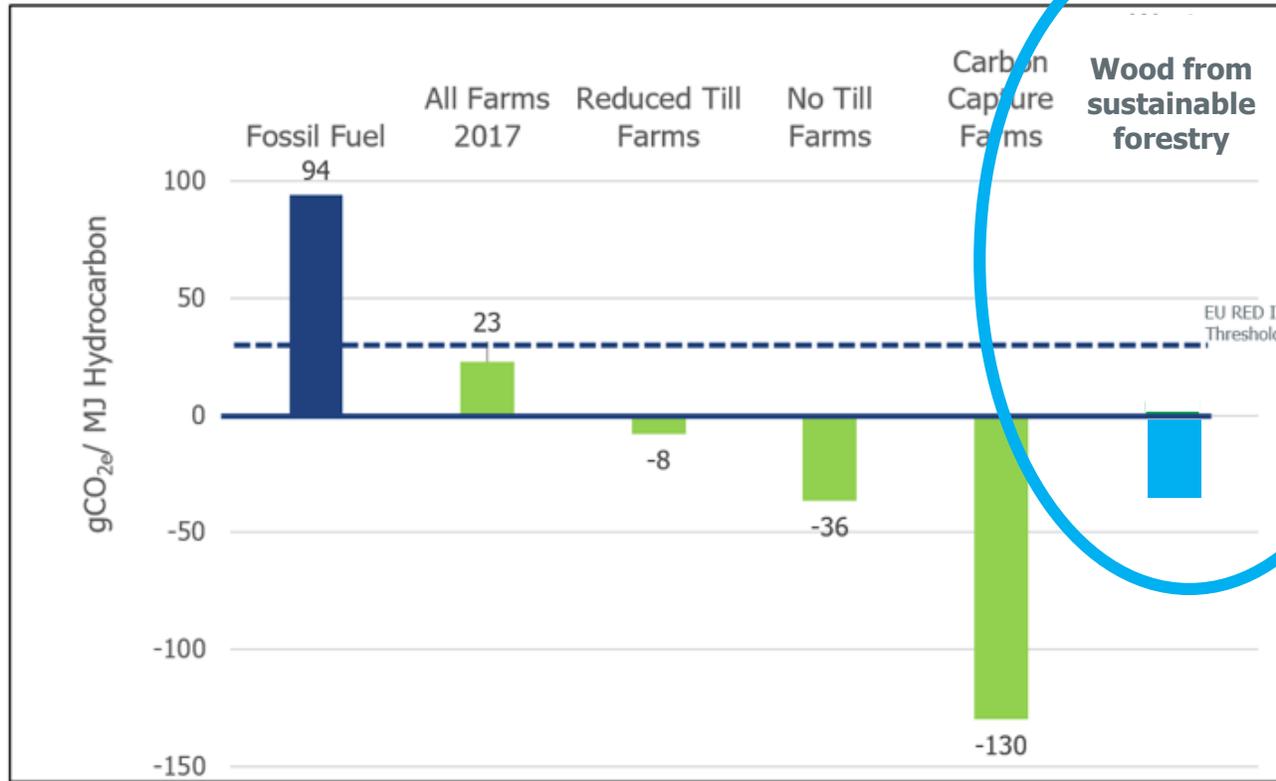


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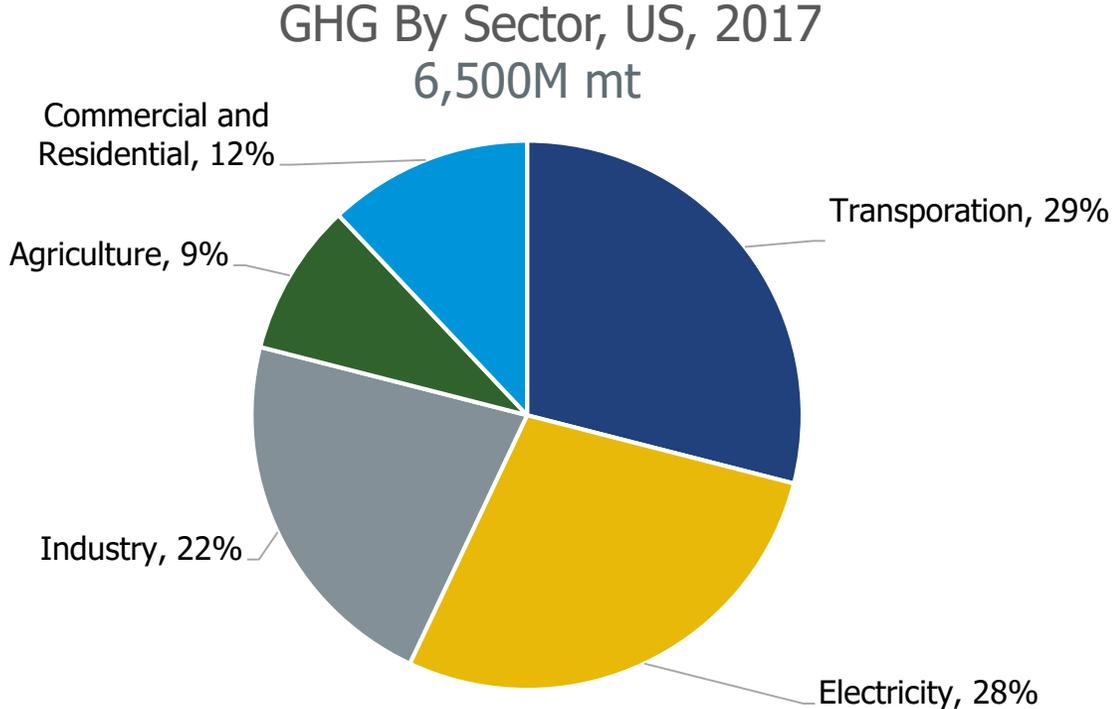
Waste streams start at zero GHG

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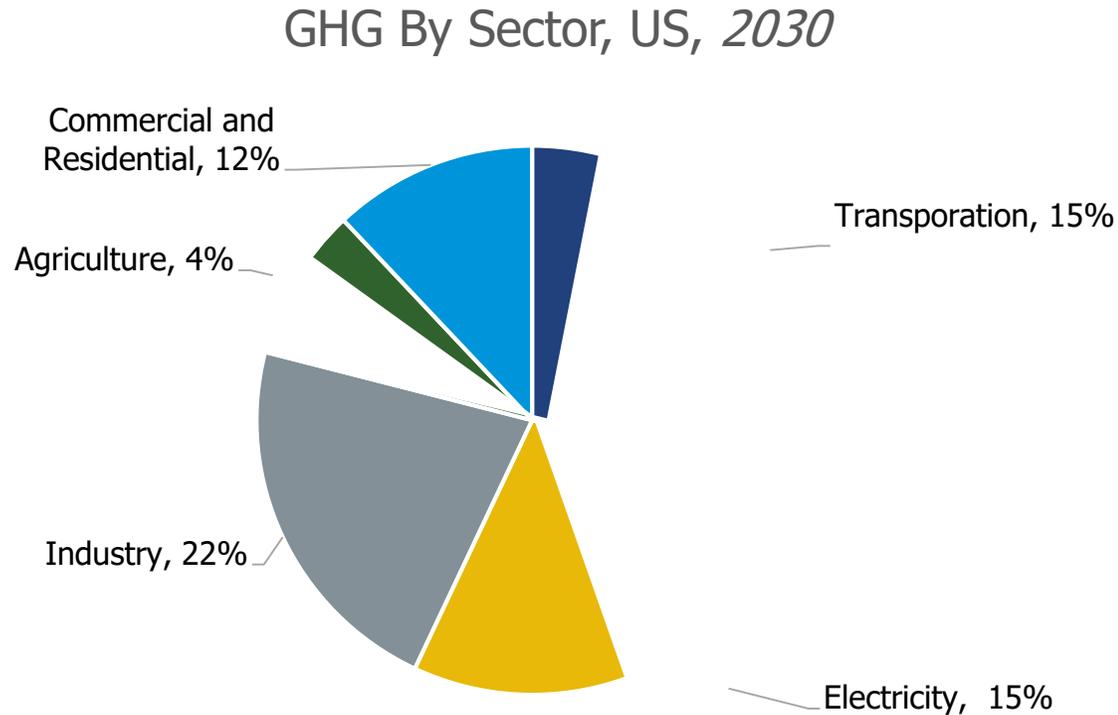


By using good forestry management practices, we expect that the GHG for wood could be negative

HOW TO CHANGE THE WORLD



HOW TO CHANGE THE WORLD



- Eliminate fossil carbon from transportation
- Integrate Agriculture and food production into the solution
- Sustainable forestry to generate raw materials, integrate into the solution
- Lot's more renewable electricity

Thank You



PAST
FUTURE