# *Carbon Capture from Corn Stover Ethanol Production via Mature CBP Enables Large Negative Biorefinery GHG Emissions and Fossil Fuel-Competitive Economics*

## *Background*

- Consolidated bioprocessing with cotreatment (C-CBP), in lieu of thermochemical pretreatment and addition of fungal cellulase, is promising for cellulosic ethanol production. Recently, carbon capture and storage (CCS) technologies to enable net negative life-cycle emissions for biofuel production has drawn attention. However, to date, CCS potential for C-CBP process has not been evaluated.

## *Approach*

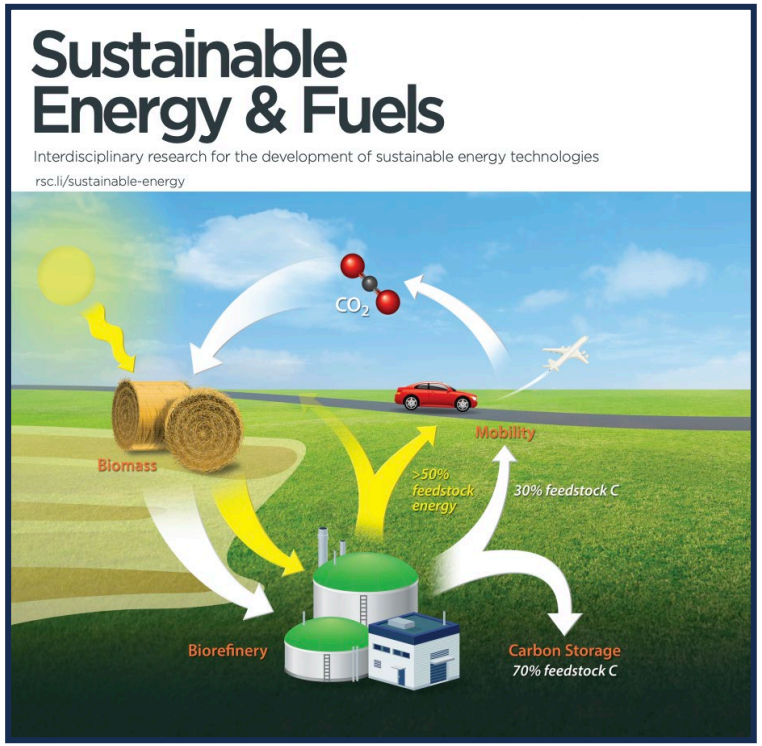
- Mass and energy balances were generated using ASPEN+ simulations and minimum ethanol selling price was determined using a discounted cashflow return on investment analysis for a 60 million gallon per year corn stover ethanol facility.

## *Results*

- Minimum cellulosic ethanol selling prices were competitive with gasoline on a $/BTU basis.
- Carbon capture at current market prices lowers the ethanol selling price.
- Adding carbon capture increases net GHG mitigation ($CO_2$ removal ) several fold

## *Significance*

- Although over half the feedstock energy ends up in high-quality energy carriers (ethanol and electricity),70% of the feedstock carbon is emitted at the biorefinery (as fermentation off gas and stack gas). Thus, CBP with CCS mitigates GHG emissions via both displacement and $CO_2$ removal.




Adding carbon capture increases net GHG mitigation

Net Emissions [ $gCO_2eq/MJ$ ethanol]

-20 Ref. Case → -85 High-Purity CCS → -170 Total CCS

**4.25-fold improvement**

**2.0-fold improvement**

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