

# Workshop report outline

## Goal of the workshop

In this stakeholder workshop, we sought to identify the challenges and opportunities of cellulosic ethanol production in Emmetsburg, IA.

## Questions of the workshop

- 1) Describe the value chain – what are the different steps that are relevant (producers, transport, storage, pre-treatment, processing, technology provider, selling and trading) and the context (policies, subsidies, other competitors)
- 2) Who are the key current players in this value chain? What is their role? (look into how different stakeholders see their own role and the role of other stakeholders)
- 3) What are the advantages of cellulosic ethanol production? For whom are which advantages? When did this new process come to their attention and how?
- 4) Where are the bottlenecks in the value chain? Who could do what about the bottlenecks identified?

## Participants

Table 1 – Description of participants

| Stakeholder group                     | Number of participants |
|---------------------------------------|------------------------|
| Extension                             | 3                      |
| Local representation – private sector | 3                      |
| Local representation – public sector  | 3                      |
| Farmers                               | 4                      |
| Technology provider                   | 2                      |

## Methods

Participants were invited to sit at three tables, where each research team member acted as a moderator and note-taker. Groups were kept heterogeneous to foster discussion on the cellulosic ethanol from different perspectives along the value chain.

At each table, large sheets and pens were provided for participants to write and draw their answers on the sheet. Participants were also provided with a blue and red sticker as means of showing priority for one issue of their choice for question 3 and 4 after deliberating with the other participants at their table.

## Answer 1 – Key steps in value chain

| Stakeholder group                     | Value Chain    |             |                 |                   |         |           |            |             |           |        |   |
|---------------------------------------|----------------|-------------|-----------------|-------------------|---------|-----------|------------|-------------|-----------|--------|---|
|                                       | Seed selection | Crop growth | Harvesting corn | Collecting stover | Storage | Transport | Processing | End-product | Transport | Market | OTHER   |
| Extension                             |                |             |                 |                   |         |           |            |             |           |        | Institutional knowledge, COOPs  |
| Local representation – private sector |                |             |                 |                   |         |           |            |             |           |        | Landlords, COOP, agronomists, ISU extension                                   |
| Local representation – public sector  |                |             |                 |                   |         |           |            |             |           |        | Educational institutions, Farm Bureau, Farm Credit, USDA, contract, knowledge |
| Farmers                               |                |             |                 |                   |         |           |            |             |           |        | By-products, community, government  |
| Technology provider                   |                |             |                 |                   |         |           |            |             |           |        | Policy  |

Green color – Represents the awareness of presence in value chain.

This table underlines that overall there is good knowledge of the total value chain amongst stakeholder groups and across stakeholder groups. There were individual variations in how stakeholders perceived the value chain, but overall participants showed a great understanding of the value chain.

## Answer 2 – Role of the key players

| Stakeholder group                            | Value Chain  |
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| <b>Extension</b>                             | <p><i>Seed selection</i> Farmers,</p> <ul style="list-style-type: none"> <li>• Seed companies (increase productivity)</li> </ul> <p><i>Crop growth</i></p> <ul style="list-style-type: none"> <li>• Farmer/producer (practices, manage, grow)</li> <li>• Landlord/tenant (utilize the land)</li> </ul> <p><i>Harvesting corn</i></p> <ul style="list-style-type: none"> <li>• Farmers (practices)</li> </ul> <p><i>Collecting stover</i></p> <ul style="list-style-type: none"> <li>• Farmers (more money, lose value to soil)</li> </ul> <p><i>Storage</i></p> <p><i>Transport</i></p> <p><i>Processing</i></p> <ul style="list-style-type: none"> <li>• POET-DSM/plant (take biomass, plant operation, logistics, grinding, filtering, adding value)</li> <li>• selling agent,</li> <li>• liaison</li> </ul> <p><i>End-product</i></p> <p><i>Transport</i></p> <p><i>Market</i></p> <ul style="list-style-type: none"> <li>• Pucharser</li> <li>• user (energy, feed)</li> </ul> <p><i>OTHER</i></p> <ul style="list-style-type: none"> <li>• Coop (growth, marketing),</li> <li>• County (economic growth)</li> </ul> |
| <b>Local representation – private sector</b> | <p><i>Seed selection</i></p> <ul style="list-style-type: none"> <li>• Input supplier (Fertilizer, Financial consulting, Equipment, fuels, energy supplies, services),</li> <li>• Farmer</li> </ul> <p><i>Crop growth</i></p>   |

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|  | <ul style="list-style-type: none"> <li>• Producer,</li> <li>• Farmers (crop production),</li> <li>• Farmer (get payback, work with COOP, agronomist)</li> </ul> <p><i>Harvesting corn</i></p> <ul style="list-style-type: none"> <li>• Producer</li> <li>• Harvesters (Biomass collection)</li> <li>• Farmer</li> </ul> <p><i>Collecting stover</i></p> <ul style="list-style-type: none"> <li>• Operators – Equipment costs/repairs/depreciation, Harvesters (Biomass collection)</li> </ul> <p><i>Storage</i></p> <p><i>Transport</i></p> <ul style="list-style-type: none"> <li>• Logistics (Transportation of biomass)</li> </ul> <p><i>Processing</i></p> <ul style="list-style-type: none"> <li>• Processors,</li> <li>• Plant Biomass (receiving, handling process),</li> <li>• Plant ethanol (processing Technology &amp; process) ,</li> <li>• POET-DSM</li> </ul> <p><i>End-product</i></p> <p><i>Transport</i></p> <ul style="list-style-type: none"> <li>• Distribution (Movement of fuel from refinery to retail)</li> </ul> <p><i>Market</i></p> <ul style="list-style-type: none"> <li>• Fuel retailer (Marketing of fuel),</li> <li>• End user ( Consumption of fuel)</li> </ul> <p><i>OTHER</i></p> <ul style="list-style-type: none"> <li>• Snow,</li> <li>• road hazards with bale,</li> <li>• by-product</li> </ul> |
| <p><b>Local representation – public sector</b></p> | <p><i>Seed selection</i></p> <ul style="list-style-type: none"> <li>• Farmers, Seed dealers</li> </ul> <p><i>Crop growth</i></p> <ul style="list-style-type: none"> <li>• farmers</li> </ul>  |

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|                | <p><i>Harvesting corn</i></p> <ul style="list-style-type: none"> <li>• farmers</li> </ul> <p><i>Collecting stover</i></p> <ul style="list-style-type: none"> <li>• baler</li> </ul> <p><i>Storage</i></p> <p><i>Transport</i></p> <p><i>Processing</i></p> <ul style="list-style-type: none"> <li>• POET</li> </ul> <p><i>End-product</i></p> <p><i>Transport</i></p> <p><i>Market</i></p> <ul style="list-style-type: none"> <li>• Big Oil</li> </ul> <p>OTHER</p> <ul style="list-style-type: none"> <li>• Bankers</li> <li>• ISU</li> </ul>   |
| <b>Farmers</b> | <p><i>Seed selection</i></p> <ul style="list-style-type: none"> <li>• Seed/chemical dealers,</li> <li>• Farmer, landowners,</li> </ul> <p><i>Crop growth</i></p> <ul style="list-style-type: none"> <li>• Equipment dealers,</li> <li>• Farmer,</li> <li>• landowners</li> </ul> <p><i>Harvesting corn</i></p> <ul style="list-style-type: none"> <li>• Equipment dealers,</li> <li>• Farmer,</li> <li>• landowners,</li> <li>• manufacturer</li> </ul> <p><i>Collecting stover</i></p> <ul style="list-style-type: none"> <li>• Equipment dealers,</li> <li>• Farmer,</li> <li>• custom farmer,</li> <li>• landowners,</li> <li>• manufacturer</li> </ul> |

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|                            | <p><i>Storage</i></p> <ul style="list-style-type: none"> <li>• Equipment dealers,</li> <li>• Farmer,</li> <li>• custom farmer</li> </ul> <p><i>Transport</i></p> <p><i>Processing</i></p> <ul style="list-style-type: none"> <li>• Plant employees, manufacturer, Project Liberty</li> </ul> <p><i>End-product</i></p> <p><i>Transport</i></p> <p><i>Market</i></p> <ul style="list-style-type: none"> <li>• Fuel stations,</li> <li>• consumers,</li> <li>• policy</li> </ul> <p>OTHER</p> <ul style="list-style-type: none"> <li>• Government,</li> <li>• COOP</li> </ul> |
| <b>Technology provider</b> | <p><i>Seed selection</i></p> <ul style="list-style-type: none"> <li>• Seed co</li> <li>• Farmers</li> </ul> <p><i>Crop growth</i></p> <ul style="list-style-type: none"> <li>• Farmers,</li> <li>• custom harvester</li> </ul> <p><i>Harvesting corn</i></p> <ul style="list-style-type: none"> <li>• farmers</li> <li>• Equipment</li> </ul> <p><i>Collecting stover</i></p> <ul style="list-style-type: none"> <li>• farmers</li> <li>• Equipment</li> </ul> <p><i>Storage</i></p> <p><i>Transport</i></p>  |

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|  | <p><i>Processing</i></p> <ul style="list-style-type: none"> <li>• Biorefinery</li> </ul> <p><i>End-product</i></p> <p><i>Transport</i></p> <p><i>Market</i></p> <ul style="list-style-type: none"> <li>• Consumers</li> </ul> <p>OTHER</p> <ul style="list-style-type: none"> <li>• Policy</li> <li>• Weather,</li> <li>• Banks</li> </ul> |
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### Answers 3 (Advantages) & 4 (Bottlenecks) experienced by key players

| Stakeholder group | Positive   | Negative  |
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| <b>Extension</b>  | <p><u>Landlord/tenet</u><br/>Land God's gift, limited land/productivity</p> <p><u>Producer of crop</u><br/>Making living</p> <p><u>Producers</u><br/>Community: Jobs created, economic benefit<br/>Development of POET – 2 to 3 gallons<br/>Able to do corn on corn by bailing, much in residue<br/>Limiting deep tillage<br/>Silage instead of bale</p> <p><u>Final end user</u><br/>(Purpose)<br/>Was need met<br/>e.g. energy, food value</p> | <p><u>Landlord/tenet</u><br/>Water quality<br/>Cover crops<br/>Conservation<br/>Corn turn vs soya turn decision</p> <p><u>Producer of crop</u><br/>Conservation<br/>Long term vs short term decisions<br/>Carbon footprint – producer fertilizer<br/>Field – organic matter nutrients<br/>Labor – weather<br/>Learning the process<br/>Process – wrap, quality of bale and storage of bale<br/>Number of passes in field – time invested per ton</p> <p><u>Process of biomass</u></p> |

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|  | <p><u>Economic</u><br/>money at all levels of the chain (Economic Profitability and Bottom Line in the value chain) Additional value of crop<br/>population<br/>County economic benefit (County revenue, taxes, job)</p> <p><u>Non-Economic</u><br/>Population increase<br/>Jobs<br/>Time constraints<br/>Sustainability</p> | <p>Employees<br/>Demand of product<br/>Community</p> <p><u>Logistics/value added intermediary &amp; Selling agent/Liaison</u><br/>Technology <math>\Delta</math>'s to meet end user <math>\Delta</math>?<br/>Perfect product to end user<br/>What will sell<br/>What can be done economically (\$)</p> <p><u>Purchaser/user of product</u><br/>Value added steps<br/>\$, Right type, right time, right place</p> <p><u>Final end user</u><br/>Meeting need<br/>Energy vs food</p> <p><u>Generic</u><br/>Equipment development<br/>Investments – working capital<br/>Policy government<br/>Lack of education<br/>Legislation challenges<br/>Return on investment<br/>Challenges of sustainability</p> |
| <b>Local representation – private sector</b> | <p><u>Input suppliers</u><br/>Market opportunities<br/>Purchase of equipment / financing on those purchases.<br/>Improvements in manufacturing processing.</p> <p><u>Landlord</u></p>  | <p><u>Farmer</u><br/>Nutrient removal / Lost fertilization<br/>Landlord relationships<br/>Small harvest window<br/>Busy time of year<br/>Timing efficiencies<br/>Labor availability<br/>Weather: number of passes</p>  |

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|  | <p>Money<br/>Income<br/>Sustainable<br/>Reduced carbon emissions.<br/>Reduced residue (corn on corn)</p> <p><u>Harvesters</u><br/>Income<br/>Equity</p> <p><u>Logistics</u><br/>Income<br/>Equity</p> <p><u>Plant biomass receiving</u><br/>Production<br/>Down time<br/>Reduce cost</p> <p><u>Plant ethanol processing</u><br/>Production<br/>Downtime<br/>Reduce cost<br/>Higher revenue stream for cellulosic ethanol.</p> <p><u>Distribution</u><br/>Policy satisfaction</p> <p><u>Fuel retailer</u><br/>Income</p> <p><u>End user</u><br/>Income<br/>Green friendly</p> <p><u>Community</u><br/>Great good jobs<br/>Generates property taxes</p> | <p>needed when taking 1T/acre as opposed to 3T/acre</p> <p><u>Harvesters</u><br/>Financial risk<br/>Consistency<br/>Small window for harvest<br/>Operators – Equipment costs/repairs/depreciation.</p> <p><u>Logistics</u><br/>Financial risk<br/>Consistency</p> <p><u>Plant biomass receiving</u><br/>Down time<br/>Manpower requirement<br/>Ash/Dirt/Rock/netwrap – Landfill<br/>Maintaining quality of bales in storage and overall<br/>Bale wrap<br/>Equipment maintained<br/>Process development</p> <p><u>Plant ethanol processing</u><br/>Finding the best process – trial &amp; error<br/>Abrasive – Stalks are hard on equipment/bales<br/>Large investment<br/>Govt policy<br/>Feedstock supply risk<br/>Difficult technology</p> <p><u>Distribution</u><br/>Gallon replacement not an increase</p> |
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|  | <p>Residue on roads<br/>(RINS [not sure what the participant wrote here])<br/>Positives Increased income to local and surrounding communities<br/>Economic benefit for the community / area<br/>Job creation – sustainable well-paying positions.</p>  | <p><u>Fuel retailer</u><br/>replacement gallons</p> <p><u>End user</u><br/>confusion of quality/performance</p> <p><u>Generic</u><br/>Big Oil (negative ads)<br/>Carbon footprint<br/>Investment required<br/>Snow drifts in winter<br/>Road hazards from parts of bale falling off<br/>Policy<br/>Soil<br/>Cost of entry<br/>Stakers, transporters<br/>Twine</p>  |
| <p><b>Local representation – public sector</b></p> | <p><u>Community</u></p> <ul style="list-style-type: none"> <li>• Emmetsburg is first to start the research for the <b>future</b> [emphasis added by participant] of new biofuel production. (The future may be astronomical)* [participant added a star on the back to elaborate]</li> <li>• Reputation of Emmetsburg (local area)</li> </ul> <p><u>POET</u></p> <ul style="list-style-type: none"> <li>• I gave you a document that shows the economic input</li> </ul> | <ul style="list-style-type: none"> <li>• Producer timeliness and investment</li> <li>• Early growing pains (bale storage) (no balers) mostly worked thru - The bales were backed up due to the construction</li> <li>• Removal of mass from fields (nutrients, potash)</li> <li>• Big Oil companies and (negative) mis-information spread about biofuels. Big battle from oil companies.</li> <li>• Lack Education of the masses</li> <li>• Do they look at other</li> </ul> |

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|  | <p>that with the establishment of POET/Project Liberty/DSM. There is a continual history in their company, along with others in Emmetsburg that has infected new start up business.</p> <ul style="list-style-type: none"> <li>• The whole process has had a lot of growth from the bales to the locations collection of bales</li> <li>• Learned where to locate the bales from the very beginning of time</li> <li>• We have good contact to assist on the federal level for legislative renewable fuels – we have built a large coalition</li> </ul> <p><u><i>Economic impact to farmers</i></u></p> <ul style="list-style-type: none"> <li>• Transportation start-up – created an outlet for young farmers to give them an added ability to assist them with financial growth.</li> </ul> <p><u><i>Economic impact to the region (area)</i></u></p> <ul style="list-style-type: none"> <li>• Different businesses were located here because of Project Liberty and DSM. (building equipment business, baling</li> </ul> | <p>products – switch grass</p> <ul style="list-style-type: none"> <li>• Transportation at time can be a challenge to stay with their contractual agreements (Transportation is still an issue)</li> <li>• Time restraint when collecting the bales</li> <li>• The equipment breakdown due to the materials that wouldn't process through their equipment</li> <li>• Refinery waivers are still an issue for the profit</li> </ul> |
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|                | <p>businesses started)</p> <ul style="list-style-type: none"> <li>• The new employees created new jobs, means new homes, property taxes, school increased, start up restaurants, hotels, etc.</li> <li>• The construction phase brought in a lot of economic impact.</li> </ul> <p><u>Production of ethanol (fuel)</u><br/>Saving the world's food source by not using corn</p>  |   |
| <b>Farmers</b> | <p><u>Farmer</u><br/>Collect biomass<br/>Grow biomass<br/>Deliver biomass<br/>Purchase equipment<br/>Select seed<br/>Conservation<br/>Money to spend on living and business expense<br/>Extras income to spend on different purchases<br/>Added economic,<br/>Better crop,<br/>Conservation – Less tillage<br/>Profitability and market for the farmer</p> <p><u>Processing plant</u><br/>Homegrown renewable fuel<br/>Employers for local economy<br/>Employees at processing plant will spend money on cars, food, travel, taxes, clothing, housing etc which keeps economy going.<br/>Clean energy, value added product</p> | <p><u>Farmers/Landowners</u><br/>Removal of organic matter and nutrients<br/>Extra equipment cost and time to collect biomass.<br/>Transportation of biomass</p> <p><u>Processing</u><br/>Trial &amp; error: Learning process of how to best make things work.<br/>Transportation of biomass to facility<br/>Changing government regulations.</p> <p><u>Consumers</u><br/>Confusion from misinformation/ lack of education.<br/>Food vs Fuel debate<br/>uncertainty in demand</p> <p><u>Policy</u><br/>Mandates<br/>Waivers of biofuel mandates to oil refineries.<br/>Attitude of the future</p> |

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|                            | <p>economic growth with a positive for the producer</p> <p><u>Fuel stations</u><br/>Sell a renewable fuel to consumers<br/>Less foreign oil</p> <p><u>Consumers</u><br/>Clean energy, Cleaner, Renewable<br/>Demand for product<br/>Availability of product</p> <p><u>Harvester Custom</u><br/>Job creation<br/>Bale, Move, harvest</p> <p><u>Equipment Dealer</u><br/>Products to sell service</p> <p><u>Manufacturer</u><br/>Increased products to build</p> <p><u>Ferventor (Not sure)</u><br/>Economic benefit, Patents</p> |   |
| <b>Technology provider</b> | <p><u>Biomass harvest equipment</u><br/>(Engineering, manufacturing, service, education)<br/>Conserve natural resources<br/>Economic returns + developments</p> <p><u>Producers/Custom harvesters</u><br/>(Use machinery, Supply biomass to biorefinery)<br/>Agronomic advantages<br/>Economic value added</p> <p><u>Biorefinery</u><br/>(Acquire biomass, process biomass, suggest better methods)</p>   | <p><u>Biomass harvest equipment</u><br/>(Engineering, manufacturing, service, education)<br/>Policy<br/>Economy<br/>Equipment transformation</p> <p><u>Producers/Custom harvesters</u><br/>(Use machinery, Supply biomass to biorefinery)<br/>Policy<br/>Weather at harvest<br/>Baler depreciates (2 dollar/Bale), depreciation of equipment; weather fall time, a lot to be done at the same time.</p> |

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|  | <p>Conserve natural resources<br/>Economic returns - Benefit to community, job creation, good paying jobs, rotate 3-4 times, tax.<br/>Synergies with grain ethanol<br/>Plant will only make money once it makes full scale operation</p> <p><u>Policy makers</u><br/>(Environmental concerns, change economic drivers)<br/>policy drivers best motivators<br/>climate change stabilization<br/>stability economics</p> <p><u>Lending &amp; Banking</u><br/>(Provide funds)<br/>Economic<br/>Community<br/>Stability</p> <p><u>Consumers (use energy)</u> – at the end of the day<br/>Environment<br/>Economic</p> | <p><u>Biorefinery</u><br/>(Acquire biomass, process biomass, suggest better methods)<br/>Policy<br/>Feedstock quality<br/>Netwrap, ash stones, capital required, working capital, planning of how much needed.</p> <p><u>Policy makers</u><br/>(Environmental concerns, change economic drivers)<br/>Elected officials change and so does opinion<br/>Long term energy policy<br/>RTS policy being challenged, lack of consistent policy.</p> <p><u>Lending &amp; Banking</u><br/>(Provide funds)<br/>stable policy<br/>stable economy</p> <p><u>Consumers (use energy)</u> – at the end of the day<br/>Cheaper than petroleum</p> |
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