Welcome to Mary Dye, State House

Letter from Patty Murray's Office, Raquel Crowley

Letter from Maria Cantwell's Office, Mike Poulson

Comments from US House Rep Newhouse's Office, Josh Lozano

Welcome to Mike Poulson, McMorris-Rodgers' Office

Introduction from Wes Jurey, ATIP

- Generating wealth creates job
  - Need to develop logistics for the supply chain
  - Need access to technology
  - Need access to banks and funding for loans
  - Need supportive government policy
  - Need to attract and train the workforce
- Goal is to create a conversation between long-term research groups and potential industry partnerships
- What are the challenges each sector sees

Rick Brenner, ATIP, Moderates Panel

Steve Csonka, CAAFI
"The Development and Commercialization of Sustainable Alternative Jet Fuel (SAJF)"

- AltAir Fuels has supplied LAX for the last 14 months with renewable HEFA-SPK fuel
- CAAFI is an aviation industry coalition established to facilitate and promote the introduction of alternative aviation fuel
  - Goal is to establish a non-petroleum drop-in fuel
  - CAAFI is a facilitator between multiple entities
- SAJF, Sustainable Alternative Jet Fuel
  - Alternative-jet fuel from sources other than petroleum
  - Sustainable-with regards to social, economic, and environmental progress
  - Jet Fuel-properties are equivalent to those of petrol fuel (ASTM standards)
- Decouple carbon production growth from airline traffic growth
  - Carbon relief
  - Easy to implement (relatively), minimal infrastructure impact
  - Lower LAQ emissions
  - Improved quality
  - Economic development
  - Multiple feedstocks, conversion techs, entrepreneurs
- Status Summary
  - Demand for lipids for several fuel production facilities currently in development should soon result in contracting interests with dedicated oilseed producers.

- Observations
    - Aviation is a committed offtaker
- US fuel Demand
    - Gas has declined & diesel has flatlined (may begin to decline)
    - Jet fuel continues to expand @ 1 - 2% per year in US
        - More opportunities internationally (85B gpy usage with 3 - 4% aagr).
- SAJF Offtake agreements
    - AltAir Fuels
    - Fulcrum Bioenergy
    - Red Rock Biofuels
    - Total/Amyris (agreement to fuel new aircraft delivery flights leaving Airbus)
    - SG Preston
    - Gevo (MOU only at present)
- Approved Production Pathways
    - FT-SPK (conversion of syngas, usually from gasification, via Fischer-Tropsch)
    - HEFA-SPK (hydroprocessing of fats, oils, and greases)
    - HFS-SIP (biochem conversion of sugars to synthesized paraffins)
    - FT-SPK/A (an addition of aromatic content to FT-SPK)
    - ATJ-SPK (the thermochem conversion of C2-C5 alcohols to Jet)
    - 6 in process task forces (3 involved with lipids)
    - 15 more processes in various levels of development (3 of those also involve lipids)
- Commercialization In-development
    - Red Rock
    - Fulcrum
    - Emerald
    - AltAir (planning 3-5x expansion)
    - Diamond Green expansion
    - SG Preston (5 facilities in first planning phase)
    - ARA licensing build-out
    - UOP licensing
    - Neste, REG, UPM, ….. Potential pivots
    - Unlocking of renewable diesel and refinery co-processing
    - Many of these facilities are dependent on oilseed production
- Lipid Feedstocks
    - Dedicated oilseeds (e.g. rotational brassicaceae)
    - Waste FOGs
    - Tall oils
    - Algal feedstocks

Dale Thorenson, US Canola Association
“Potential for future canola acreage growth in the PNW”

- Production in WA/OR/ID, MT, ND, the Southern Great Plains (SGP), and the South (double cropped w/ soy)
- Record 1.9 million acres of canola acreage in 2017

- The PNW is an area for potential growth of canola production; although currently only 50k acres grown in WA and 78k acres in MT I believe that Idaho and Oregon Acres were also mentioned. 2016 they were ID 21k and OR 4k.
- ~200k acres predicted in the PNW, similar amount predicted in the SGP
    - SGP has 15-10% wheat boost with canola rotation
    - PNW plants 9-10 million acres of wheat annually
    - Canola is good for bees and other pollinators

Dan Long, USDA-ARS Soil and Water Conservation Research Unit
"Grant Project Overview"

- "Accelerated Commercial Development of Hydrotreated Renewable Jet Fuel…."
    - Grant has been underway since 2012, funded by NIFA grant
- Project directed by Terry Isbell
- Focus was on supply chain from field to the pump
    - Upgrade oil quality to refinery
    - Lower biofuel cost, make more competitive w/ petroleum
- Biofuel Development Analysis
    - Feedstock Development
    - Conversion/Co-products
    - Deployment
- Feedstock Development
    - Genetically improve Brassica Napus to enhance oil yield and quality (compatibility with HRJ conversion)
    - Determine how production environments affect yield and oil content
    - Identify production options for incorporating oilseeds (LUC)
    - Optical sensing of crop quality and yield/ remote sensing
- Biofuel and Co-Product Development
    - Develop processes to remove crop impurities
- Biofuel Development Analysis
    - Various economic and sustainability analyses
    - LCAs for carbon, energy, and water
- Rural Economic Development
    - Assess farmer and business attitudes concerning oilseeds
    - Expand business networks with growers
- Question: [participant]
    - What were particular traits of interest for genetic improvement?
- Answer: Jack Brown
    - Focus was on oil yield, meal value, resistance to abiotic stress(establishment for winter canola)
    - Uniform yield is important for farmers
    - In general, roughly 22% of crop yield gains and variability can be attributed to genetic traits of cultivars; and 78% of yields are determined by growing conditions(e.g. heat and precipitation) and cultivation practices
    - Improving winter hardiness of oilseed crops is critical for success in PNW
- Question: [participant]
    - How much residue does canola produce

- Answer: [participant]
    - Not much Residue is produced; and these residues should remain on the field to protect and replenish the soil
- Answer: Jack Brown
    - Winter canola produces 6k lbs/ac, spring 2.5k lbs/ac
- Question: [participant]
- Answer: Dan Long
    - Canola is expanding as wheat prices drop
    - Winter survivability is a struggle
- Answer: [participant]
    - Additional issues are landlords, bankers, and the availability of crop insurance
- Answer: [participant]
    - Potential half of residue is harvestable
    - It is also important for returning organic carbon and nutrients to the region's soil; and providing ground cover to help reduce soil erosion

David Archer (Call-in from Mandan, ND) & Krishna Pokharel, Northern Great Plains Research Lab, USDA-ARS
"Economics of Production"

- Market prices for canola oil for food has traditionally been more expensive than jet fuel
- More efficient land use, as a means to reduce feedstock production costs
- Farm-Level profitability
    - Agronomics: productivity, inputs, rotational impacts, climate and soil effects
    - Local demand
- Field Research, Minnesota Soybean-Camelina Relay Cropping
    - Break even analysis: winter varieties are the most cost effective, included production costs and wheat break even price
    - What is the value of the benefits provided to the wheat rotation?
- IMPLAN analysis for North Dakota
    - Initial analysis of new oilseed production
    - Does not include potential impact of fuel conversion
- Farmer Adoption
    - More than just money
    - Overcoming risks
    - Investments, capex
- Farmer Survey, what are valuable characteristics & market attributes
- Overview of model outputs, GHG reductions, energy
- National Crop Impacts (LUC using POLYSYS)
    - Been working w/ U of Tennessee to develop new POLYSYS w/ built in oilseeds
- Key Points
    - Feedstock Availability
        - Influence of agronomics, economics & adoption
    - Spatial Impacts
        - Need to know where, how location changes yields (climate impacts)

- Question: [participant]
    - Does your winter canola break-even price account for the fact that wc on the Palouse takes 2 years to grow
- Answer: David Archer, USDA-ARS
    - No, also dependent on the place in the crop rotation

Dan Long, USDA ARS
Oilseeds Evaluations for stress environments

- Evaluated 12 spring varieties, 6 winter varieties
- Included napus, carinata, etc….
- 3 years, 8 locations
    - Each location had small grain or fallow previously
- Took regular measurements throughout the growing season
- Faced challenges with winter varieties, as winter kill and flooding were both issues
    - Moscow performed well
- Spring canola performed more consistently
- Genotypes respond differently in different environments
- B. napus & B. juncea produce the highest oil yields
- Winter camelina was the only variety to survive winter

Jack Brown, U of Idaho
Impact of Regional Genomic Trials

- Objective: genetically improve B.napus feedstocks for jet fuel production
    - Oil yield and quality stability
- base/training population
    - 652 winter lines
    - 230 spring lines
    - Associate performance with genotype
    - Built up 5 terabytes of data (inspect differences between varieties)
- Genetics have a limited effect on crop yields
    - Especially winter hardiness is a valuable characteristic
- Winter canola produces as much as 4x more max production than spring canola
- Euricic acid is the best fatty acid for jet fuel production
- Also evaluating blackleg resistance

Michael Brodeur-Campbell, Honeywell UOP

- UOP licenses tech for refining, petrochemicals, nat gas, and renewable fuels
- Drop-in fuels are compatible w/ existing engines and infrastructure
- UOP Ecofining produces green diesel
- The boiling range of natural oils overlaps with diesel and jet
- Process:
    - Deoxygenation
    - hydrocracking/isomerization
    - Product separation (makes jet, diesel, light fuels)
- Approved to mix w/ 50% petrol jet, ASTM D7566, D1655
- Can implement in new facilities and existing petrol refineries

- Product qualities are the same regardless of the feedstock
- License tech to operating facilities
    - Diamond green (Louisiana, expanding)
    - Eni (Venice, soon Sicily)
    - AltAir (first green jet)
- Expanding feedstocks for renewable diesel/jet fuel production
    - Interested in oilseeds, algal feedstock, cellulosic sources
- Improved jet yield for longer chain oils
    - Affected by the balance between cracking and isomerization
    - Up to 6.4% higher yield for jet fuel, 1.7% distillate
- Hydrogen consumption is dominated by the degree of saturation
- Field to tank yield is dominated by crop production

- Question: [participant]
    - Did you use a high euricic variety ??
- Answer: Brodeur
    - Was not available for us
- Question: [participant]
    - Are there differences in the capital cost of equipment for Honeywell-UOP's biojet refinery process compared with conventional petroleum jet fuel refineries?
- Answer: Brodeur
    - The UOP system capital costs are 'slightly greater than' (?%) conventional refineries; this is due to the more corrosive properties of the organic fatty acids that require the use of stainless steel equipment in biojet distillation.
- Question: [participant]
    - Is there value in the waste stream
- Answer: Brodeur
    - Outside of range

Chris Cassidy, USDA- Renewable Energy Advisor
USDA Projects and Programs

- Start with Bioeconomy Supply Chain
- Must close the loop - get products into the hands of consumers to encourage more involvement from USDA … etc
    - Farm bill is currently in negotiations
    - "Multiplier" success of the industry builds on itself
- What are the needs to get insurance, investments, and engineering
- Leverage opportunities with private companies
- New Secretary of Ag (Sonny Perdue) is supportive of oilseeds
    - What are the impediments to improving ag in the US (loans, investment)
- Support new technology, and the supply chain to tie it together

- Question: [participant]
    - What will the impacts of the proposed 2018 budget be on oilseeds-related programs?

    - Explanatory Notes on the proposed USDA 2018 budget provide insight to potential impacts (https://www.obpa.usda.gov/fy18explan_notes.html)
    - Facilitating and encouraging federal agencies to cooperate in advancing the development of sustainable bioproducts from oilseeds is urgently needed. It is also critical to protect and continue the important research and commercialization initiatives that have brought us to this point.
- Answer: Cassidy
    - 28 organizations have some bearing on oilseeds, hard to tell. recommends research on the financial side, need to justify with new jobs and improved rural economy. Avoid the "valley of death": jump from research to commercialization, incentivize with public/private partnerships (has been done with broadband, fracking…)

Afternoon Session:
Wes Jurey moderator

- The banking community needs an education. They can become an ally or an adversary
- where is the disconnect between the 20 billion gallons of jet fuel produced and the predicted acres to produce it
- There is a disconnect between high school kids and careers in renewable fields - bioeconomy?
- Money is available, but there is not a balance sheet for many new techs. No matter how good a tech might be, farmers won't commit without a proven balance sheet
- Beat the fuel versus food debate, oilseeds don't damage food supply
- Be wary of one crop to push, encourage all varieties
- How do you grow a crop that is used for low carbon fuel, when you can't afford to grow that type of crop, you can't afford the policies that affect you
- From a grower's standpoint, it's all about price
- Can the entire supply chain be profitable?
- Can SAJF be economically sustainable with or without policy is the question. Working with ASCENT to review risk and reward across an entire supply chain. How can we help companies decide to commit to alt fuels production. Need early commits/success examples, and with success comes followers. At today's oil prices, SAJF production ROI will not approach 20% while delivering cost competitive fuel. Co-products will be

key, ARA, Honeywell and other companies are evaluating high-value co-products to augment the business case. Other states on the West Coast, Canada, and the East Coast are exploring LCFS-like policy, despite poor outlook on the federal level.

Participant: There are many ways to approach the problem, and the agronomics make sense. Farmers have shown a good response to workshops, more people are entering the market. Oilseeds can not be mono-cropped. Columbia Grain/other elevators need a market, that they can count on, to effectively commit.

Participant: Policy is extremely important. Both Red Rock and AltAir have moved to states with positive policy for renewable fuels. AltAir was originally a Seattle company

Participant: companies like REG are involved across the entire supply chain with all of their fuels. WA has an opportunity to take on a leadership role. Education and Awareness has a gap, but the gap is closing. Developers and producers should work more with farmers and policy makers. USDA, federal programs, have been used by REG, been useful. Most fuel from REG Grays Harbor is sent to other markets with fuel incentives (CA,OR, Canada). The whole value chain needs to be secured for more commitment, the supply chain already exists. Permitting is also important, not to be overlooked.

Participant: The airline industry needs to find a way to collaborate -- but with public transparency and avoidance of market collusion -- to establish an assured aggregated cross-airline demand for a significant quantity of renewable biojet fuel in the early years of commercial production. The industry's pooling of off-take commitments; and purchasing of biofuel for well above the current industry market price for petroleum jet fuel would stimulate and provide 'purchase order' support for financing and building biojet production capacity from the field to the refinery. Such premium priced offtake agreements would help open up lending from banks and capital investment; and would present a multi-year market for oilseed feedstocks. Credible, longer term commitments for bio-oil feedstocks will be necessary to persuade farmers to adopt new crop rotations that include oilseed crops.

It is critical that public and private decision-makers consider the rural development and job creation potential of investing in optimally scaled value-added enterprises that supply farmers their needed inputs and services for production; harvesting and storage (field-to-market); and that process and transport bioproducts to 'biorefinery' production sites (i.e. biojet fuels, biopolymers, bionutrients, etc.). <u>A more distributed investment in rural value-added businesses could stimulate economic and social vitality in many of our nation's rural areas.</u> Our society must recognize and value the wide ranging benefits of restoring our rural communities and our regions. We should call attention to this opportunity to foster farming community resilience and growth by encouraging and enabling a more sustainable and equitable bioproducts from oilseeds production infrastructure.

"Stimulate the Industry."

- The jet capacity for all 4 of the first facilities is sold out. The commitment from airlines has still left 3 out of 4 lacking funding. More airline companies are working to secure

renewable fuel, tons of interest, and they likely do pay above market prices to foster early development of the industry.

- Fuel adoption needs to be consumer driven, most people have no clue that airlines are using renewable fuel; let consumers demand renewables to drive need.

- Companies are reluctant to admit that they are using renewable fuel, because it does add an additional cost, that consumers are often not interested in paying. Companies are most interested in price stability. Some economists have estimated that OPEC will continue to drive prices down, further stifling attempts at renewables. The more stable the price, the better the commitment from companies.

- A carbon cost would assess the real cost of using petroleum fuels versus renewable fuels

- Suggest conducting a study of what role can an airport play (instead of an airline). Although airlines do not have stable demand, airports typically do. May also be interested in new infrastructure during good economic periods

- have worked with just growers and fuel producers, but there are many more concerns. What is feasible for everybody, and how should those ideas be discussed

Wes Jurey: How do you overcome objections, hurdles.

- Would not like to see a mandate requiring airlines to buy a particular type of fuel. Those costs would trickle down, negatively

- The market has largely developed organically, acreage has increased and the crusher came to WA largely without policy. Consumers drive long-term sustainable products, not policy. Food versus fuel debate cannot be ignored, why are waste products not being used/considered. Can “burning food” be economically and environmentally sustainable (globally and locally)? Carbon tax would fall hardest on rural communities, and would likely not help renewable fuels production. Policy makers should be more involved with farmers and producers, as the policies they make directly impacts them (wider education). Has learned a significant amount during talks, and has a better respect for the work and thought that has been done.

- Heard from growers, refiners, and users, but not processors. Farmers want more money and refiners want cheap feedstock -- there is a gap that is filled by crushers.

- Vegetable oils can also be used to make high-value polymers. Co-products/waste stream also have significant value. We should look at oilseeds more as a portfolio of products, instead of just jet fuel

- The money is not there for industrial use vegetable oil to jet fuel now

- Two major products from oilseeds: high nutrition meal for livestock and fish; and bio-oil. One of the major issues is whether or not the meals are being properly valued and authorized for market applications as feed. There are many tests that must be conducted to certify the types and amounts of meal that various livestock may safely consume. The USDA and FDA should apply more resources to expand their assessment and certification of bio-oil meals for feeding livestock and fish; this would help build additional market value and revenues for farmers and seed processors.

[comment of participant added post-forum] I wanted to call your attention to an important issue concerning oilseed production to supply bio-oils. During the Oilseed Workshop, I had not realized that the best (preferred) bio-oil feedstocks for biojet refining are those with high levels of erucic fatty acids. I've since learned that most edible oils and meals are preferred to have low levels of these same acids.

This seems like an issue that warrants further consideration and assessment of its impact on the growth of market demand and oilseed production. The farmer's choice of which oilseed to cultivate will be driven by market price signals for both oils and meals. It appears to me that a 'better for food and feed' -- or a 'better for fuel' divergence of market demands is likely to occur.

Perhaps most farmers are well-aware of this dichotomy when it comes to oilseeds; but I think that going forward, ATIP and WSU's collaborative biojet/bioproduct from oilseed analyses should call attention to and explore these factors in more detail.

- Fuels standards are not mandates, they don’t require particular processing techs or feedstocks. WA needs a major market mover to make capital available to potential producers

- RIN credits require certain carbon emission reductions. HRD from canola does not qualify for RIN, need to work with EPA to change/develop. How do camelina, carinata compare?

- Winter and spring canola have significant research, up to 30 years. New types of oilseeds will require similar amounts of development.

- Winter canola has a lot of potential, but fall stand establishment is an issue in low rainfall zones. For farmers on the Palouse (high rainfall) to grow winter canola they need moisture in summer, which can only be gathered with a season of fallow. Winter survivability is also an issue. Currently September 15th is the latest recommended date for planting canola in the PNW; however the rains needed to stimulate germination occur in mid-late October. We need to breed canola varieties that could be planted later in autumn to benefit from the additional soil moisture.

- is it right to take food out of production to make jet fuel instead, especially since there are multiple uses of canola in the food supply chain

- WWCC has looked into training more skilled workers, since there are already people ready to farm canola

Rick Brenner: Back to food versus fuel…

- Other places have built wealth on commodities other than food. Is it better to shift away from wheat in WA, which is largely exported, to canola (93% of US canola is imported). Can't solve every issue at once, but need to value all facts at once, with as many opinions at the table at once as possible.

- Canola could be like cotton in the south (not used for food)

- Small farms give people good work (earn a living with dignity). Iowa has taken the approach of growing first, finding uses second (with corn and soy).

- Introduction of canola in multi-year crop rotations can help improve wheat yields in the following growing season. One farmer in attendance said that he had experienced a 25% increase in wheat production following canola.

- Canola needs more growers, and more growers won't come until canola is more reliable. The producers need to make money, and it is a huge risk to make money (high risk/high reward?)

Dan Long (USDA): breeding needs to focus on winter hardiness, and improving reliability

- The US can improve sustainability by turning to more efficient solutions. Farmers send crops to S America for ranchers. A better option may be better to talk about feeding fewer animals (~15% efficiency return)

- Improving farmers' grain storage capacity for oilseeds will be an important way to enable farmers to buffer and follow market price fluctuations; thus enhancing farmers' ability to profitably sell their oilseed harvest for an optimum price

Dan Long (USDA): (Using a slide included in his presentation) Looking at carbon 13 can be a good way to measure water stress. Different cultivars perform very differently, camelina may be a better fit for dry environments because of its stress resistance. Breeding should focus on multiple species for multiple environments.

- Agronomics is just as important as breeding for different environments

- It is essential to recognize that building a renewable biojet cultivation and production industry will require focused attention and understanding of farmers' assessment of the risks and potential rewards of growing oilseed crops. As small businesses, they face different financial challenges and available resources than those confronting the airline industry or biojet fuel refiners. It will be important to consider the factors that most significantly influence how farmers approach economics versus larger companies when developing strategies and public policies to advance biojet production.

- Many jobs and companies have been supported by the state's investment in the biofuels economy, such as the REG plant in Grays Harbor and the PCC plant in Warden. Increased canola acreage has been a result of research and extension work supported by the state at WSU over the past 10 years. However, acreage is still low compared to the capacity of the processors. Incorporating oilseeds into Washington's cropping systems is challenging and still considered high risk by many growers. WA wants to continue supporting the biofuels industry.

- the government (USDA) could help with crop insurance, make subsidized crop insurance when a year is bad.

- The approach being developed around the world for sustainable fuels development includes considerations for indirect land use change. That will be a factor. CAAFI wants to take advantages of unique situations, and the opportunities in this region are one of those potentially valuable unique situations (dryland wheat rotational farming). Will continue to work in this region, and continue work with people from this group to break down and overcome issues.

Brief look through Chris Cassidy's slides (computer malfunction during his presentation; substitute computer provided at end, and Chris Cassidy's slide were presented)

- Many different organizations in the USDA are looking into renewables
- The USDA has invested huge amounts of money into biofuels loans?
- Rural Business Cooperative Service - Energy Programs
    - Have offered a variety of programs
    - Funding is being constricted? According to new budgets

- bring back USDA loan program??

- one likely budget cut is that program. Farmers and stakeholders should talk with legislators about valuable programs that should be supported and increased.

MARIA CANTWELL
WASHINGTON

United States Senate

WASHINGTON, DC 20510–4705

June 6, 2017

Washington State University – Tri Cities
227 Sitka Court
Richland, WA 99352

Dear Friends,

Greetings and thank you for inviting me to today's forum. I regret I am unable to join you. I fully support the mission to develop and implement commercial use of biofuels for aircraft and other vehicles.

Thank you all for the groundbreaking work you have done to launch America's research efforts into aircraft biofuels. These efforts will increase our understanding of producing and refining biofuels while also supporting America's aviation economy which supports 10 million jobs and $1 trillion in economic activity.

I was proud to support WSU Tri-Cities' Center for Excellence for jet biofuel research so that Washington state would be leading the charge when it comes to helping reduce our nation's dependence on foreign oil, while also lowering prices for airlines and consumers alike. This year, I led a bipartisan group of Senators introducing legislation to extend the biodiesel tax credit so that our domestic biodiesel industry will have certainty and stability as they compete on a global stage.

Please accept my best wishes as you collaborate at today's forum to understand the research that has been conducted and the best ways to bring this technology to bear on the market. Congratulations on all that you have achieved and please do not hesitate to reach out to my office if there is anything I can do to support this vital mission.

Warmest Regards,

Maria Cantwell
United States Senator

From: Lozano, Josh
To: RBrenner@atipfoundation.com
Subject: Office of Congressman Newhouse-ATIP FORUM
Date: Tuesday, June 06, 2017 2:15:52 PM

Mr. Brenner,

The following is the statement provided at today's event:

"On behalf of Congressman Newhouse, I would like to say thank you for having me here today on Rep. Newhouse's behalf. Congress is in session and therefore Congressman Newhouse could not be present today. I want to start by saying that Congressman Newhouse is a farmer and he deeply understands the agriculture industry first hand. In addition to being a farmer, Congressman Newhouse worked for Governor Gregoire as the Director of WA Department of Agriculture, prior to being elected to congress. Congressman Newhouse's background as a farm and his experience at the State and Federal levels of government, further adds to his ability to advocate for our nations agriculture industry and related fields. Please keep Congressman Newhouse's office in mind with respect to your agriculture related concerns. Thank you."

Regards,

Josh Lozano
Senior District Representative
Office of Congressman Newhouse-WA04

OILSEED-TO-BIOJET FUEL FORUM AGENDA

June 13, 2017 | Fargo, ND

PRESENTERS:

Steve Csonka – CAAFI (coalition facilitating and promoting intro to alternative fuels in aviation)

The development and commercialization of Sustainable Alternative Jet Fuel (SAJF)

Attempting to produce synthetic jet fuel by starting with hydrocarbons other than petroleum … with an end result of ASTM D1655 – pure hydrocarbon fuels. Long-term goal of decoupling carbon growth from traffic growth by reducing carbon emissions in the aviation industry by 50% by 2050.

Questions:
[participant]: Wondering about comments made regarding stabilization of jet-fuel?:
Don't know what will happen on the technology side. Some opportunities, but it lends credence to our desire to develop this technology because there may be disruption on the petroleum side. Aviation doesn't want to bear the brunt of such a disruption.

Ryan Pedersen – US Canola Association/Northern Canola Growers Association

Accelerated Commercial Development of Hydrotreated Renewable Jet Fuel from Redesigned Oilseed Feedstocks Supply Chains

North Dakota grows about 1.5 million acres of canola (largest US producer); US acres canola acres continue to grow. Potential of 3 million acres in North Dakota; and a total of 6.5 million acres of canola in the US.

Questions:
[participant]: - On the fuel side – you know have two things: price and carbon. The crops will come as price comes, as research develops. It can be done.

[participant]: – Concerns in the Dakotas about soil and cover … do you think there will be a risk by putting a soybean followed by canola, or what should a crop rotation look like? No tilling or conventional tilling?
- We're attempting to understand what the rotation should look like. Perhaps a cover crop on the canola stubble may assist, prior to coming in with the soybeans.

- Challenge is soil temperature. No till had moisture, conventional till needed the rain. Bushels were less in the no-till.

Terry Isbell – USDA-ARS

Hydrotreated Renewable Jet Fuel Feedstock Development, NIFA Grant Overview

Studies conducted to look at HRJ genetics, stress trails, processing and conversion, economic and life cycle analysis, assessment of acceptability of an HRJ production system. Then, outreach through educational forums to share results.

Questions:
[participant]:– Canola is a commodity, but it took a long time for it to be considered as one. Do you think these emerging oilseed crops will transition from contract grain to commodity? And, is it necessary?
- Dave Archer – We'll touch on this later, ultimately this is the question. If other oilseeds are fuel-feedstock, what's the progression is the question. We don't have the answer at this time.

Russ Gesch – USDA-ARS

Oilseed Evaluations for Stress Environments

12 spring Brassica lines (representing 6 species), 6 winter Brassica lines (representing 3 species) – tested in 8 environments/3-years of data.
Results of preliminary findings shared in the presentation.

Questions:
[participant]: – c13 data, was that oil in the seed?
- Yes, whole seed was ground and used for measurements.

[participant]: – You selected these varieties years ago, if you selected now what other varieties would you include?
- I would have included more varieties of certain species such as camelina and carinata. To do over again it would be nice to try more genotypes of some of the species to evaluate genetic variability.
- Terry Isbell – He would expand to Kansas and Georgia. We would have expanded species.
- We'd love a more freeze-hardy canola. They are early enough maturing and it provides more options, and a cover crop.

David Archer – USDA-ARS

Economics of Production

Industry cost challenge – the current cost of canola oil is higher than the cost of jet fuel; farm level profitability must also be present for the system to develop. Focus groups looked at what would be needed for farmer adoption of the crop. Transportation and life-cycle assessments were also conducted.

Questions:
[participant]: – impact of price on the amount of jet fuel you'd produce … at $500/mg, at $600/mg … does the cost of the jet fuel change with the cost of analysis.
- It was based strictly on the feedstock availability.

Michael Brodeur-Campbell – Honeywell UOP

Hydrotreated Conversion Analysis

UOP Renewable Jet Fuel Process – Honeywell has developed this process for the production of renewal source jet fuel – "Ecofining." Produces a fuel that is a chemical replicate of current jet fuel – with a 50%-90% savings in green house gas.

Questions:
[participant]: – when you are looking at the degree of unsaturation to hydrogen consumption within emerging oilseed feedstocks, how do they compare to other feedstocks such as used cooking oil and soybean oil?
- More unsaturated

[participant]: – high acid feeds … ;
- should be acceptable feedstock and provide good jet yield.

Dave Archer – will this be at existing refineries or new.
- Yes, existing as it is likely a co-processing route. Blending of traditional and alternative is practice. Some regulation hurdles.

[participant]: – AltAir facility is their price the same as petroleum jet fuel.
- Don't know specifics, but believe it is competitive. Navy sale data is not attainable, and other partners information is proprietary. "Competitive" is what is shared.

Chris Cassidy – USDA-Renewable Energy Advisor

Commercial Development Oilseed to HRJ – Federal Programs

How do we accelerate the commercialization? USDA has many programs; each play a role in portions of the bioeconomy cycle. An outline of specific programs/grants/loans that may apply was reviewed.

DISCUSSION PERIOD

Overview – Demand; Supply; Research Supply Chain; Economics of Production; Yield

Economic Opportunity – Education & Awareness; Finance (access to capital); Federal Resources (technology); Policy; Workforce; Supply Chain (infrastructure)

Additional Key Themes Suggested by North Dakota Forum:
- [participant]: – Awareness, does this include public acceptance.

Answer: Yes, it is public acceptance as well.
[participant]: – Economic opportunity – where do you think efficiency and sustainability fall within these categories?
-- under “Technology.”

Education & Awareness
[participant]: – Crop Insurance – this seems to be a big hurdle. How do you solve the issue of making crop insurance available, because I don’t see farmer’s being interested without it.

[participant]: – Canola Group – If you are going to move anything forward, you have to have the producer and crop insurance. If you are going to build supply chain components, everyone must be involved to create success.
o Agree. We need everyone working together.

[participant]: – Standpoint of higher education, I can see the workforce needs. Working with the natural biologicals is something we’re not used to. We need to encourage our students to start working with these materials. We could then potentially bring some educational materials to the table to support the industry growth.
- Cooperative Extension Service – how can they be helpful/resource?

[participant]: – When we were talking about camelina – grower concerns, rotational benefits, etc – what are the answers?
- David Archer – We do not have those answers. We’re looking at the models but they don’t capture all that is needed. We have a partial answer. Equipment – we were able to do everything in the trials with our existing equipment with the exception of (canola and any of these) swathing was something that we used. Producers may not own this is they don’t swath. Also, the ability to store additional crops may be an issue (in certain regions based on crop diversity).

Ryan Pedersen – Need to education the final consumer … not the airline industry, but their customers who they want to look good for. Comments I hear are “let’s use this crop as it isn’t for consumption,” “or this one doesn’t respond well for fertilizer” – could we target on these two things so producers could benefit from quality and high yield. Perhaps more research on those who are already leading.

[participant]: – Specialized equipment helps improve efficiency, however it is often not needed to ‘try’ new crops. Farmers are adept at making what they have available work and solving production problems, even if it is temporary. Producers who have been testing camelina and carinata in South Dakota use duct tape to adapt their existing wheat and other small grain planting and harvesting equipment to accommodate the smaller seed sizes. If a regional farmer has a positive experience with a new crop, other farmers in the area are more likely to try it. Reducing the risk of new crop adoption and gaining the interest of leading, innovative farmers will assist in introducing new oilseed and other biofuel/energy feedstocks.

USDA - We have done some rotational crops and we've seen positive benefits. Pollinators too. Oil seeds produce a lot of nectar and pollen … can support a bee colony for a year.

[participant]: – Need help from the agricultural community … what is the durability? Concerns about crop failure/drought/etc. – Carinata – what is the durability? I can always get canola oil. What is the durability of these others to become a crop that is viable.

[participant]:– Food waste is a potential renewable energy source. But, it is important to remember that even wasted food came from a farm. There is a fundamental difference between rural and urban understanding of agriculture. The majority of consumers live within urban environments and do not understand agricultural systems. Rural residents with connections to agriculture and understanding of agricultural systems are the minority. Agricultural sustainability affects biologically based renewable energy pathways, regardless of whether it is from a primary or secondary (residue or waste) source. Rural agricultural systems are critical to maintaining and increasing both food and fuel production. They are the foundation which support national and international system sustainability. Investment in sustainable infrastructure and production within aging rural systems is needed to maintain agricultural production.

- USDA – people will pay more of a price for food than for fuel. If yields of an alternative oilseed are similar to canola but would have less input costs, you'd have a good case.
- Dave Archer – we need to be careful to not make unrealistic claims. There is no "miracle" crop, as it needs to be backed by science. It does take inputs, and from an efficiency standpoint, we want to use those inputs to increase profitability. A crop that produces more with fewer inputs is more profitable.

Access to Capital

[participant]: Agriculture has a gap to capital as it take a long time to bridge things out.

[participant]: – suggest rewording or broadening Access to Capital … access to capital and include ways to reduce risk. We have a technology that competed against UOP technology, but it is seen as too risky to access capital. Suggested framing this point in a new way.

[participant]: The GMO/Herbicide technology is what has made that crop profitable for farmers. I see this happening with other crops. If the tools are there to make it profitable, farmers will do it.

[participant]:– The BCAP program is both geographically and crop-type limited. States like South Dakota, North Dakota, and parts of Montana don't have access to these programs. It is a beneficial program which reduces risk and encourages agricultural producers to produce emerging oilseeds and other bioenergy feedstocks. Could it be expanded?

- Chris Cassidy – that program is up for renewal it is time to speak up to make changes like these. It is a matter of working with your executives to move it from state to federal as recommendations. Here's what we need to do and why, who will benefit and what should the funding be.

- Rick Brenner – is this an initiative that should come forward?
- Chris Cassidy – there is no problem in the language but rather the interpretation of what the language has exempted in this region.

Wes Jurey – Commerce could move this issue to the state level very quickly.
[participant]: Don't have the answers here today. Can you summarize it at $50 a barrel crude oil, this may work economically.
- Steve Csonka – With policy support that has been in place, three elements – RFS RINS, Federal Tax policy (expired at present, but could come back), and California low-carbon fuel standards. These make oil seed conversion to jet fuel possible at today's oil price of $50 a barrel. We hope to start to include aviation from 2018 forward, but LCFS does not include jet fuel today. An LCFS moving to other states and Canada could provide opportunity. This standard provides value commensurate with the level of carbon reduction … if you support green fuel this is a key standard. We should be interested in moving LCFS forward. If you don't have these elements in place it will be difficult. But I can't say nothing will happen without policy as there are difference between feedstock prices on the spectrum. We're interested in moving down that list in a supply/development perspective. Honeywell may do the same things with their vendor/technology-users. Keep in mind there is a thriving biodiesel and renewable diesel industry already.
[participant]:– is the best way to move ahead with a plant to offer a bolt-on plant to a crushing facility in existence.
- Steve Csonka – Only one facility producing SAJF today - not a bolt-on scenario, rather a refinery retrofit. W.r.t. adding on to a crushing facility - there may not be much gain other than oilseed transportation and storage cost reductions. Those costs are modest w.r.t. other costs, like the oilseeds themselves, or the CapEx and other OpEx costs. Need other fundamentals (access to hydrogen) which might not available at crush facility. However, industry is interested in looking at how to retrofit existing refineries if possible. Others looking at various brownfield and greenfield .

Michael Brodeur-Campbell – expanding refineries is likely a better option. Petroleum is also an input in canola production. If petroleum goes up the cost of canola goes up. There is a break-even point, but it is not a simple relationship, there are a number of other factors in the equation.

Terry Isbell – could have two product streams. We see from the data that the C22 fats are useful for jet fuel. We didn't split the fatty acids and oleates, which could be used for a multitude of things. Marketability of these C22 products is small, the market for these is fuels is larger. If you look at C18 and C22 you expand the potential for markets.
- Michael Brodeur-Campbell – Palm oil produces palm fatty acids, that can be used for many things and produces a waste stream. So there is model for that scenario.
- Wes Jury – think of this as multiple crops, not one crop … there are multiple streams.

[participant]: – is there job development opportunity, building a plant etc. Is there a model with opportunity, but there is a lot of current facilities that are retrofitting or closing … is there a point where we could see a need for additional plants being built in areas where none exist.

[participant]: – they're going to buy from existing supply chains. They want a big, bulk fuel purchases that are also producing petroleum fuel. What supply chain has to happen for my company to take carinata seed … I just need to get it one of those facilities. Increase of crop in this region could supply the chain. The other part that could produce jet fuel at a quality price it would need to go elsewhere. He did not see any opportunity for expansion in this market other than in the area of crop growth (no refinery/no crushing – he would use existing sources for this). You can build production and then once you catch up with other technologies the industry will be there for you.

- Steve Csonka – current models have demonstrated something slightly different than that. There is opportunity for refineries that serve specific airports. We can see that model (like LAX) could take place in different areas. The aggregated demand slide (15 facilities) in vegetable production all across the US – can serve business aviation on commercial side, and interested in production and a broad range of airports. Commercial aviation invested for supply surety. Some activities limit the availability to get jet fuel to facilities (natural disaster, etc). Whether there would be interest for the region? Demand at MSP is significant. Put together a supply chain that showed value of production in the region through crush facilities, fuel distribution, etc. … it looks viable for the region. You need to be able to leverage something for that region with production … conversion technologies with available feed stocks. The concept of being able to co-process in existing refineries is attractive, but is not exclusive. On a total system-wide cost level, it's attractive. Downsides: co-fed perspective – many of those molecules don't end up in jet fuel; intent on the aviation industry is that NGOs expect us to address our own sectors; that refinery co-processing approach is less satisfying than a more dedicated source. I expect refineries to begin incorporating renewables in different ways as technologies develop. In the meantime, we're working with entrepreneurs and others to capitalize on things that exist like being located next to a landfill or timber basin.

Rick Brenner – question for ADM – are you involved?
[ADM participant]:– we're involved in crushing and have a plant at Velva. None of those are running at full capacity. Been involved in many projects where concepts are coming to fruition … at the end of the day those that have been successful have been top down … what is the price and then we'll figure it out down to production. Are we involved? – I'm here to find out the status of this. The capacity is out there if we see the direction.

[participant]: – Farmers use diesel fuel in the production of oilseeds and other biofuel feedstocks. We could reduce the net impact of biofuel and food production by using renewable diesel or biodiesel in agricultural production. Renewable jet is not typically the largest volume product of biofuel production. Renewable diesel is. The commercial airline market is not the only drop-in biofuel market. In the northern Great Plains, the military (including the National Guard) is one of the larger jet fuel consumers. Training exercises and long-range deployments use a lot

of fuel. Military renewable jet fuel purchases from locally-sourced renewable biofuel production could be used to jump-start regional drop-in biofuel production and use of renewable diesel in agricultural production. This would improve both energy and food security nationally.

TECHNOLOGY

[participant]:– trying to understand the study that Terry worked on. I get a sense that you see some of the issues with variety selection and trying to compare all of these crops within a hugely diverse region of the country. We've taken a select cross-section of varieties, I understand some of those varieties shown, not top producing or best oil profile. How do you change that to make it better? How do you make valid comparisons.

- Terry Isbell – Economic analysis we looked at all university trials. North Dakota, South Dakota have extensive data, Kansas State as well. We look at these to find the best varieties for regions. We had a broader role, we tried to pick representative varieties to understand physiologies and growth of them along with their general characteristics. How do you adapt this broad information?

USDA – This is a first cut to look at what traits to improve – oil profile – continue to improve. Variety trials can look at that more extensively.

[participant]: – We're focused on jet fuel today, my background is in micro-biology. The inventor of this technology taught me about tunable processing technology – makes the economics work. You can tune the system to produce what the feedstock says we should do best and suggest … then the economics become more attractive. Multiple products.

[participant]: – We have been talking mostly about the oil from oilseeds. A large fraction of the oilseed is not oil – it is protein and fiber. Animal feed might be the most economical use, but we should be encouraging development of higher value products and associated technologies that make the system more economically robust.

Steve Csonka – This project was robust and had a broad set of goals … it was an introduction to some of the elements that were critical. During that time, some commercial entities worked on the attributes you are all talking about … the features. There are entities within these groups that are looking at commercialization. Absolutely, there is potential demand for unique products that could come out of oilseeds. Some folks are looking at these in a dedicated fashion. We've got this activity that has been precipitated by a unique group looking for unique product … but you'll have spinouts that capture incremental revenue to help build this industrial sector. We are on the cusp of that occurring. The national labs are saying this is something to be looked at … a unique chemical profile that might create a market, that hasn't been created yet. We hope this SAJF market-pull facilitates all that. We expect to see a full portfolio of products come out of the expansion of oilseeds.

POLICY

[participant]: – creation of fuel agnostic – leveraging the feedstocks to get the most efficient support. Regulations support both traditional and renewable. As we see solicitations for research, it would be nice to see a more balanced approach.

Brian Pedersen – RFS renewable diesel – canola and other oilseeds haven't been approved. If you don't have the checkoff for smaller crops you need sources of $$ for these other smaller crops.
Steve Csonka – applications have to be made to push an oilseed through. Crop have to meet the criteria. Pennycress happened with almost no money. EPA has a good system for consideration of data to approval. Look at the details of the requirements - to gain approval you simply have to have a volume of research available.

[participant]: – Carinata is approved because Canada came forward with a lot of financial support. Agrisoma couldn't have done that as a company.

[participant]: – It can be difficult to attain a designation. The federal government can stand in the way of business occurring.

Terry Isbell – co-product use – 4 labs of USDA spend a lot of time on co-product development – gums, lignin, etc. – we're far ahead of the curve. Some of these compounds are taking 20+ years to develop marketability. Being ahead of regulation means discovery and then future use. Researchers get contacted frequently to help bridge that technology for whatever the product to assist in the approvals.

Rick Brenner – These 4 labs Terry references are those that Henry Ford lobbied for in the late 1930's, and built around 1942– scientists are very creative, and it seemed like, in my capacity at ARS as Assistant Administrator for Technology Transfer (until retirement in 2012) I needed to get over there periodically and follow them around with invention disclosure forms! How do we engage the private sector to understand what opportunities have been created? I have a high regard for ag labs and don't want to see them shut down (reference to President's 2018 Proposed Budget).

[participant]:– Sometimes you have to have $$ to wait for the technology. Corn sweeper business – farmers built a plant – the margins turned negative and Cargill saved the day. Ethanol has a safety net. Corn can be any price and you still have to meet some of the ethanol requirement. What is our safety net? I see environmental positive things, but is there a safety net if the margins turn negative.

- Wes Jurey – some of it will need to be policy.
- Steve Csonka – some discussion around RFS modifications – concept of having a renewed policy that has caps/floors, carve-outs, or concepts that reward the carbon reduction. People are afraid to open up RFS legislation because there is no reasonable expectation of what could happen. Floors/Caps – we need your ideas for your region for federal consideration.

Chris Cassidy – It is going to be through stakeholders and citizens that the government gets the message. Laboratories serve as an incubator to advance, co-products discussion. Entrepreneurs, private sector and inventors will move this forward. You can't break even on fuels alone – you need the package deal of co-products to create the profitability. Paints/polymers/pigments/lignins/fabrics/farm materials/athletics … you can't wait for the government to come up with the ideas. Open the doors and let the youth/entrepreneurs lead.

WORKFORCE

[participant]: – We've talked about partnerships … should we consider partnerships with DOL, Education, Others – to help train the future workforce. How do we create the skills for the jobs we will need and begin training to get there?

Wes Jurey – how can "registered apprenticeship" work to help develop this workforce to serve the emerging industry? DOL is our first drum beat, followed by Dept. of Education. We need to think about what the future workforce looks like and engage these agencies to make it happen.

[participant]:– looking at applying for upcoming apprenticeship grants, and better poised to do that … really working to give us more of a foundation to get a plan together.

SUPPLY CHAIN

[participant]: – If you have on-farm storage for canola after harvest, you can increase your price point. There is a regional lack of infrastructure storage for non-core commodities (over-winter), especially oilseeds. Oilseeds need a different type of storage than wheat or corn as they are more volatile. Supporting on-farm or localized storage of oilseeds and speciality crops (non-GMO, organic, etc.) would help with supply chain flow.

[ADM participant]: – we help in this area because we need supply throughout the year. Canola is not the most long-term storable product (10 months). We buy a lot of sunflowers and the amount of farm storage (South Dakota) is huge. They become a residual supplier because they store the crops. We don't pay the same price – it varies. Specialty products, we have a delivery window, but then store to support. We have assets in place if we can come up with a variety and price, we could make it work. We're looking at it.

[participant]: – The northern Great Plains export food, energy, and water resources to national and international markets. As a result, transport efficiency is an important sustainability factor. Rail cars and pipelines are more efficient than trucks. Rail car availability can be an issue during periods of high rail transport demand due to export of multiple products. There is a regional need for efficient, low-cost, and sustainable modes of product export and transportation infrastructure.

[participant]:– as we think of scaling up our crop – what recommendations do you have, we can make decisions about transporting the seed, we need to understand what those options might look like in terms of cost … how would we approach what resources are available for use in the network.

[participant]: – DOT VOLPE Research Center (https://www.volpe.dot.gov/our-work/infrastructure-systems-and-technology/situational-awareness-and-logistics) is conducting studies are to determine supply chain impacts and assist in improving supply chains.

[participant]: – tap into the infrastructure that already exists. Companies know where they want to get supply. Use what you have until you outgrow it.

National Center for Aviation Training (NCAT),
4004 N Webb Rd. Wichita, KS
July 11, 2017

8:00 AM **Registration**

8:30 AM **Welcome and Overview**
Wichita State University / Kansas State University Hosts, and Wes Jurey, ATIP

9:00 AM **Panel Discussions**
Rick Brenner, ATIP Panel Moderator

Sustainable Alternative Jet Fuel (SAJF) -- Demand and Supply Status
Kristin Lewis, CAAFI

Potential for Future Canola Acreage Growth in the Southern Plains
Jeff Scott, U.S. Canola Association

Grant Overview
Terry Isbell, USDA-ARS

Oilseed Evaluations for Stress Environments
Dan Long, USDA-ARS

Impact of Regional and National Canola Trials
Michael Stamm, Kansas State University

10:30 AM **Break**

10:45 AM **Panel Discussions** *(continued)*

Economics of Production
Jason Bergtold, Kansas State University

HRJ Conversion Analysis
Michael Brodeur-Campbell, Honeywell UOP

Moving Forward: Federal Programs
Chris Cassidy, USDA-Renewable Energy Advisor

12:30 PM **Lunch**

1:00 PM **Dialogue and Discussion for the Southern Plains**
Wes Jurey, ATIP

4:00 PM **Adjourn**

Note: Wes Jurey was unable to attend / participate due to flight cancellations in Washington, D.C. Dr. Brenner represented the ATIP Foundation, in substitution for Wes Jurey

Non-Attribute Notes from Wichita, KS "Oil-seeds to biofuels" forum
(Raw notes provided courtesy of Conner McCollum, KSU)

NOTE: Attributes are retained for any comments made by any presenters identified on the agenda

Presentations:

1. **Kristin Lewis- Sustainable Alternative Jet Fuel (SAJF) -- Demand and Supply Status**

Question	[participant]	One of the economics reports identified contract conditions desired by growers. What has been operational experience with contract production of SAJF feedstock?
Answer	Lewis	CAAFI has been primarily focused on contracts with the airlines, and less so with the producers. We are interested in equitable supply chains, including risk sharing and profit sharing so that the stakeholders across the supply chain are able to handle the risks associated with this approach.
Question	[participant]	What are the top two or three commercial scale jet fuel providers?
Answer	Lewis	Altair is currently the only one in the U.S. although there are others abroad. Note that some producers of renewable diesel could potentially make jet fuel even if they are not currently doing so.
Question	[participant]	Is there any kind of summary report that overviews the entire process, and discusses all of these systems involved in this production of SAJF?
Answer	Lewis	Yes, there has been a few regional reports (e.g., MASBI, SAFN). There is an overview document on the overall alternative jet fuel development process that is included in the CAAFI website. There are other documents, especially the MASBI report would be of interest to this group. Researchers presenting today are looking at farmer adoption and break even prices and other aspects of feedstock and supply chain development, etc., as is the FAA-funded ASCENT Center of Excellence.
Question	Jeff Scott	If you have a preference for inedible varieties, how will these inedible types of oilseed feedstocks be segregated from edible feedstocks in the commercial elevators, and crush facilities?
Answer	Lewis	One of the challenges the aviation industry has seen is the concern about use of feedstocks that compete with or interfere with food production, which is why inedibles have been of significant interest. However, the concern about segregation is a valid one and useful for us to take back and discuss with our stakeholders.
Question	Rick Brenner	Why are there restrictions on the blend?
Answer	Lewis	Mainly because we don't have a very good sense of how the composition of the fuel affects the performance, plus there are certain elements we know we do need to have in the fuel in order to function properly. For example, if you don't have

		sufficient aromatics in the fuel, then you will have problems with elastomer seal swell in the airplane. There is a lot of research going on right now through the FAA-funded National Jet Fuel Combustion Program to get a much more predictive understanding of how different components and blend levels will perform in the system.
Question	Rick Brenner	What impact is the recent climate accord going to have on the airlines industry?
Answer	Lewis	The CORSIA is still in place and was a very industry-driven agreement, and work is continuing to develop the components that will address the alternative fuels component of crediting within the system.

2. Jeff Scott- Potential for Future Canola Acreage Growth in the Southern Plains

Question	[participant]	What are the farm equipment requirements for canola harvest and growth? Revenue?
Answer	Jeff Scott	Bees are not needed for pollination, but helpful to the crop and very helpful for bees. Equipment requirements? None. There's not much specialty equipment required to grow canola. More money is required for inputs in canola over wheat. About $250/acre for wheat and about $300/acre for canola
Question	[participant]	Can canola production be expanded across the U.S. in different regions, or do climate characteristics drive the production of this crop?
Answer	Jeff Scott	There needs to be continued breeding work done in winter type canola for there to be significant expansion within the U.S. . The largest amount of research done is for spring canola, which will benefit the northern states over any others, but the largest acreage gains will be seen in the PNW and Southern Great Plains where canola can be rotated into a 30 million acre wheat growing area.
Question	[participant]	When does your crop flower? How does your crop respond to temperatures > 90F during flowering and seed-set?
Answer	Jeff Scott	We have spring and winter canola in the US, so normally our canola flowers at the end of the march in the winter type areas, and late summer for the spring crop. Temperatures of 90F at flowering have been seen at times without negative effects. Please keep in mind 90F is not often seen in March/April during flowering; 90F as seed is maturing is quite beneficial.
Question	[participant]	How do you find the amount of acreage available to canola production
Answer	Jeff Scott	Adoption percentages of the major wheat growing acres make up the backbone of these acreage rates

Question	[participant]	What is the price stability of canola compared to wheat?
Answer	Jeff Scott	Price of canola is relatively stable at $2-$3 per bushel above wheat production
Question	[participant]	Is the production cost comparable between wheat and canola?
Question	Kristin Lewis	You mentioned canola has great pollen quality for bees - do you know if this is similar with other Brassicas and broader mustard relatives (e.g., Camelina)?
Answer	Jeff Scott	Not sure, but definitely have seen evidence that canola is uniquely high quality for bees.

3. **Terry Isbell - Grant Overview**

Question	[participant]	Did you just do that in location sites you stated earlier or in canola production areas like KS & OK?
Answer	Jason Bergtold	Surveyed extension across 10-11 states in western united states, and we surveyed farmers in all those areas as well
Question	[participant]	The other oilseed crops that you included in your sideshow- where did you get this information?
Answer	Terry Isbell	A lot of them are native- we went to commercial suppliers to look for these other crops besides canola. Mostly these are industrial oilseeds, wherein we got this information from many different sources.
Question	[participant]	Roll of emergency oilseeds, comment on crops like those as other crops?
Answer	Terry Isbell	I actually started the pennycress project. I think this crop has a lot of potential because it is an off season crop that can be implemented between other major crops. Canola also has a lot of potential because it produces protein and oil. I'm talking about looking at this from a long term perspective. It will be hard to ignore the fact of how much protein and oil can be produced, especially with future varieties.
Question	[participant]	Can all of these oilseeds be handled by the same processor or sent to the same elevators/ crushing facilities?
Answer	Terry Isbell	I would think you would want to keep those streams separate. The canola could be used in an edible stream, whereas camelina would be in an inedible stream.
Question	[participant]	Do you have an idea of which fatty acids (and oilseed species) would be best for jet fuel?
Answer	Terry Isbell	The ones that are longer in chain length. Erucic acid containing oils look like they have a bigger potential for biojet fuel production. Crambe would be my top choice, but was not included in this presentation.

Question	[participant]	Can you specify the locations the winter canola survived? Reference to seeding populations and production practices used to establish the winter canola entries in these research plot locations should have been made as these have a huge bearing on the establishment of this crop. Blanket statements saying the winter canola did not survive are not objective when commercial acres of winter canola with farmers in some of these areas have been very successful.
Answer	Terry Isbell	Winter Canola only survived in Moscow, but did not in any of the other site locations.

4. Dan Long- Oilseed Evaluations for Stress Environments

Question	[participant]	Can you tell me when the approximate planting dates at your location are?
Answer	Dan Long	Winter wheat planting can occur by late September, or early October. The problem with planting at that late in time with oilseeds is that a lot of times, the plants have not reached a maturity stage that will survive the winter.
Question	Kristin Lewis	Are arbitrary events (e.g., hail-related loss) used as 0's in your data set, or do you exclude those data points in your analysis?
Answer	Dan Long	The variance creates difficulties with the statistics, so we normally exclude that data.
Question	[participant]	Reference to canola too small to handle cold, plants can also be too big which result in failure as well. Do you work w/ growth regulators? Bolting plant goes into reproductive mode is one issue but growing point extension (non- reproductive) where growing is pushed up physically by new leaves being added making plants more susceptible to freeze injury. This is a common issue in southern US frequently misdiagnosed also. Our PGR work shows very positive results on controlling this issue.
Answer	Dan Long	Plant growth regulators are just only beginning to be used in the pacific northwest. Breeders like Jack Brown are recommending feeders with more bolting to help with that. The growth regulators will be very helpful for transitioning seasons.
Question	[participant]	Growth regulators are not registered in U.S. for winter canola. on these growth regulators so that they can be used by farmers in the U.S. time. We need to look at a push towards getting regulations out Not allowed to use, and is only used for research at this point in .
Answer	Dan Long	APHIS and EPA is associated with the growth regulators regulation that need to be approved and registered.
Question	[participant]	In research did you look into GMO crops for oilseeds?
Answer	Dan Long	The first 2 commercial canola plants that were included in the PowerPoint are GMOs. We can test all forms of GMO's. No plans for continuation of research into GMO production until we have more information.

Question	[participant]	When you decided to research in current locations, did you look into what regions you can grow spring canola in? How did you determine these locations to raise winter canola that far north?
Answer	Dan Long	It had to do with stress, heat, and drought factors to compare the data with other regions. This year in fact has had great success because of lots of rain and it really depends on the year.

6. **Michael Stamm- Impact of Regional and National Canola Trials**

Question	[participant]	I would encourage you to study rotation of wheat with canola and the interaction between these crops.
Answer	Michael Stamm	We have done some research on canola- wheat rotation, wherein we saw a large increase in wheat yield after canola. The KSU study showed an 18% to 52% increase in wheat yield.
Answer	Jeff Scott	I am thinking applying pressure to increase funding for winter canola research could be an important thing for this group to look at. Regional adaptability and agronomy research are important to winter canola production.

7. **Jason Bergtold- Economics of Production**

Question	[participant]	I think that in the long run farmers will benefit from more options of crops, and that this increase in diversification will actually be more profitable to the farmers in the area.
Answer	Jason Bergtold	I would agree that growing oilseed crops will provide a significant benefit to other crops, especially in rotations with wheat, to soil health, yield etc. It is common in farming culture to do wheat year after year, but I think we need to look at more rotation, most obviously with oilseeds. The resistance by producers to switching to new crops that farmers are not accustomed to will provide a serious mountain for us to climb. The oilseed market could help diversify farming operations. A gradual shift towards oilseed crops should continue if the price continues to increase. There is a potential possibility that reductions in wheat production from converting acreage to oilseeds could be offset partially by the increased yield due to the rotation of the oilseed crop in existing wheat rotations.
Question	[participant]	There seems to be a need for education for producers for these oilseed crops.
Answer	Jason Bergtold	I totally agree. We talked to agribusinesses and research scientists as well as producers in person and in another mail survey. Part of our study was assessing outreach needs with research scientists, agribusiness and extension. We learned there is a lack of knowledge

		in these communities about biofuels in general and especially using oilseeds for bio-jet fuel production. .
Question	[participant]	Comment about farmers resistance to grow specialized crops, can you explain further?
Answer	Jason Bergtold	There are examples in which new crops have been promoted by agronomists and others that have failed. The reason is that they are trying to start a new market and farmers are highly adverse to the uncertainty surrounding a new crop. That is, many farmers are risk averse by nature in new and uncertain markets and situations. Speculation and volatility within crop prices has really led to serious swings in prices, especially in recent years. This has only increased uncertainty about new potential crops being introduced into the agricultural landscape.
Statement	[participant]	Producers think specialty crops odd and different don't want to do it. Approximately 10 counties in South-Central Kansas have canola education.
Statement	[participant]	You need to have that relatively close processing plant/ crushing facility. Most farmers do not want to spend time and resources on the road hauling to remote locations, easier to grow another crop

8. Michael Brodeur- HRJ Conversion Analysis

Question	[participant]	Was the triglyceride composition recorded? What was the proportion of triglycerides?
Answer	Michael Brodeur	They would be very high triglycerides, and very low free fatty acid contents
Question	[participant]	What type of algae does this company use, and what're the yields associated?
Answer	Michael Brodeur	We do not produce algae oils. I do not have the yields associated with this particular crop.
Question	[participant]	Can you tell us what the feedstock is that is being converted to that green jet fuel and what are the economics for that process at LAX? What is the basic feedstock being used?
Answer	Michael Brodeur/ Kristin Lewis	The economics are competitive but I do not have the exact numbers on hand. I really can't say with certainty what feedstock is being used when they all are very similar and act very similarly in our operations. Beef tallow is being used for now, with expectations of using vegetable oils down the road, especially as planned facility expansion occurs. The fuel is not traded on the commodities market, so we do not know the exact price, but we are told it is competitive.

9. Chris Cassidy- Moving Forward; Federal Programs

Question	[participant]	When you talk about fiscal year 18, is that new money or money that's

		already been promised to things going on?
Answer	Chris Cassidy	We have a farm bill that lasts 5 years. Some of the farm bills have been put into mandatory spending, so I think that we would have been fine for 2018. My strategy of recommendation Is don't wait, get started on these programs while these doors are open.
Question	[participant]	Given the ideas of more oil and coal, how do you think that people working in the market of renewable fuel- how do you think we sell this idea to the public?
Answer	Chris Cassidy	It doesn't affect the sales it just needs to be marketed. The market is too large and the only thing holding it back is public knowledge and will not be affected by current administration.
Question	[participant]	Does it have to be small business to apply for grant? What is the deadline?
Answer	Chris Cassidy	All programs are different, so the specifics of the program and eligibility of your entry to the program depends on the organization.

Discussion Section

Jeff Scott: I know each step in this process and this bioeconomy has its own unique challenges. As we move from the field to the fuel tank, everybody's faced with their own unique challenges and hardships to it. As a farmer and a representative of a farm organization, if we cannot empower our people to grow it, we can't crush it, crack it, or put it in the fuel tank. We are hamstrung with poor funding in research development and extension. The funding from canola NIFA program, National Canola Research Program, has been funded at around the $825,000 mark, and that is a nationwide program, less than a million dollars. Then you take 30% overhead from each university that gets a slice of that pie. What you get down to practical research and then extension of that knowledge out to the farmstead is miniscule. People like Mike Stamm and others in the land-grant university system are doing an incredible amount of work with limited funding and use that money to leverage off of other sources, but from a national perspective for an oilseed, $800,000 dollars is ridiculous. There is far more money thrown away on less worthy causes than that, and so that is something I think we need to start focusing some research dollars and some extension dollars. Whether it be canola or camelina or whatever oilseed is used, there has got to be money to research the agronomics and the practical applied research, and extend that to the farm community. So like I said, if you can't grow it; you're not going to crush it, crack it, or put it in the fuel tank.

[participant] Going with what Jeff said, If the farmers can do it economically ,there are technologies that are available around the world that we are not able to use and I want to reiterate, we need some help in getting products approved that we can use and not having farmers use them off label, so that they can increase their production and do it at a more economical level. We talked about the price of fuel; it was too high, so we need to get the price of the canola pulled down. The way to do it is to do it with more economical production and maybe the airlines need to pay more for the fuel. Green doesn't come free.
Rick Brenner: And let me just say a couple things relative to the idea of funding. Farm Bill is the first opportunity to start to get sustainable differences because that is the authorization for expenditures. Then it is the angle for appropriations coming out of Congress where additional leverage is needed. Chris can't go talk to them, because he is a USDA employee. I'm a former USDA employee. The ATIP foundation was established external to the government. We can work with any agencies, any departments, and we can go talk to Congress as well. The Farm Bill is probably the first place to start looking at wording to enhance research funding. The annual appropriations is always a challenge and it's unpredictable right now as to appropriations and what's going on in Washington. I don't know if there is a solution, but we would like to be able to assist where we can and the power of having these regions involved is much more powerful, rather than if this was just a single conference we held at one location. This sort of documentation will be provided which will be helpful with that. The other thing, cooperative research agreements or specific projects that industry needs addressed; first of all the cooperative research and development authority, CRADA, allows for that partnership with federal scientists and CRADA authority is granted to all federal R&D agents. Their process varies from agency to agency, but here's the advantage to the CRADA. Number one is that the private sector is contributing to the research in that cooperative research development agreement. The value in that, especially for industry is that any invention that arises from that research and from that statement of work, that private sector/industry/company has the right of negotiating an exclusive license to that technology without federal register notice. Now otherwise as federal scientists make inventions and the agencies will file for patent, if you're a company that wants to license that technology, it does have to go through federal register notice of the intent of that agency to license this specific technology to this specific company, and then they have to give a period of 30 days or so for anybody to object, and the objection cannot be "I don't think that company should do that", but needs to be more like "we would like access

to technology like that as well." Sometimes the margins are pretty thin; you can't have a whole lot of slices of pie with multiple licensees. The CRADA is the way to get specific research jointly conducted with a federal agency, and preserve the right to an exclusive license. So that's one. Number two is that most universities have a similar sort of arrangement through cooperative research agreements so what's key here is what should really be happening here, is that we should start with the stakeholders who have issues, researchable issues that need to be addressed.

[participant]: In regard to that licensing, will the government defend the patent litigation that oftentime comes from something like that? Otherwise, that's relatively worthless.
Rick: Well, believe it or not, it isn't. The government does not assist in that but what they do is give you the right to file against infringers. I can tell you that in my years at ARS and in my last ten years I was the Assistant Administrator for ARS technology transfer, and I had the sole authority delegating the secretary of agriculture for licensing any technology and also for looking at any issues brought up by the licensee against the infringe. We had 3 cases within about 10 years.

[participant]: Have they received this support?
Rick:Actually, the infringements were where the company that had the licensing from the USDA was able to go after them because they knew that the government was in support of their pursuing that.

[participant]: Very good program, very informative. So I'd like to answer 3 of your questions. For research, I think we need more research. I agree with Jeff on crop variety selection, whether that be winter survivability, but also the oil content that will make the best biofuel and how do we get producers to adopt? In my county, we need a more local market; they need to be able to see where that crop is going, to see a tangible product, and I think if we have a more local market/crushing facility in closer proximity than 375 miles away it would be a tangible thing they could see. As far as a pilot project, not sure who would fund it, but we would like to do a feasibility study in our county because we raise quite a bit of canola and there is a lot of canola raised in the region on what is the feasibility of putting in some sort of processing facility for whatever.
Rick: Maybe a COOP or crushing facility?
[participant]: Yea

Rick: Other thoughts and ideas on that?
[participant]: Has Chris Cassidy's phone number for further discussion.

Rick: So that's an interesting suggestion. In fact, what came out of our discussions in Richland, WA was that in fact the likelihood that we will jointly look at putting in an application for funds for a regional pilot project.

[participant]: As follow up to that question, I have already been thinking about that kind of an application, but it wouldn't necessarily have to be associated with jet fuel. Could it not also be associated with biodiesel?

Rick: Or even coproducts.

Terry Isbell: Biosynthetic technologies, which was on Chris Cassidy's list, actually as an interest in canola oil for ….. So there is something you might be interested in.

Rick: ….Other thoughts and comments about the challenges and opportunities for economic development based on this 5 year research project?

[participant]: We need to convert wheat.

Rick: The food vs. fuel argument didn't come up as much as it has in other forums. Are there additional thoughts on that? And Jason you mentioned that that's something that is unavoidable to some degree. You're not sure that it's a big issue, here on this food vs. fuel. Any additional thoughts or inserts or recommendations?

Jason Bergtold: The big issue concerning food v. fuel was the impact on food prices from changes in crop prices. This occurs due to changes and/or land-use changes. I would say in terms of a land use perspective… it's unavoidable. By planting one crop, we have to replace land that was dedicated to another purpose. To get a significant market for any biofuel will require significant land resources and that will compete with current land under crop production at some point, especially if the prices are high enough. A highly profitable biofuel feedstock will produced on good agricultural land to maximize profits, even if done sustainably, and this will compete with other crops that could be grown on that land, including food crops. If feedstock production displaces a large amount of food production, this will decrease supply of the food stock (at least in the short-run), putting upward pressure on prices. But again, higher prices for the food crops will make them more competitive making them more desirable to plant again in the future, shifting acreage back toward the food crop. Markets to an extent will adjust to a new equilibrium, but I would say it may be somewhat premature to state exactly by how much this may affect food prices in the U.S.. I'm an economist and I do have a faith in markets, food markets will adjust accordingly. Impacts on food prices did occur in the past with the spike in crop prices, which was partly driven by an increase in the demand for biofuels the past few years, but we have seen these prices come back down. It is debated by how much biofuel demand increased food price, estimates range from 3% all the way up to around 30%, but it was by no means the most or only significant factor driving prices during that time. Another related issue is if we want edible or inedible feedstocks that come from current crops that is another issue, as well (e.g. canola vs. rapeseed). Farmers may actually prefer this, but this could drive up food prices in the short-run, but increased acreage of these crops due to increased demand would likely eventually bring crop prices back down, which we have seen to a degree with corn acreage.

Rick: Well one issue we have is by 2050 we need 40% more protein to feed the world population. Where will we get it? It only comes from a few sources.

[participant]: So to increase your protein by 2015 you can just take the canola byproduct and feed it to beef. So that would increase your protein.
Bryan: Canola seed 60% meal which is going to food or feed anyway, 40% oil so it's a perfect solution for the food vs. fuel debate. It's rated more in favor for food.

[participant]: I made the comment several times today about grain on the ground. If you drive around the country you see the amount of wheat and/or corn sitting on the ground outside of elevators that are already full and this is last years crop, not this years crop. We have no place essentially to put this year's corn, beans and almost the wheat we just harvested have no place to go. We don't have a problem with fuel vs. food, we have so much excess grain it will take several years to chew that down. I see this as a good opportunity to convert from excess food to useful fuel. I don't think there is a conflict now, I realize you talk about projections of population growth and in 20 years we will have a problem.

The problem right now is the producers have a problem today because we have too much food on the ground and we can't get rid of it we can't get any price support for what we produce today.

Rick: Keep farmers sustainable.

[participant]: I don't think producers care where it goes, whether it's for food or fuel. We don't care if it's jet fuel for LAX or canola oil. We're producing a commodity, when you're producing a commodity you don't care where it goes as long as there's demand. We've heard talk the past few years of two ears per plant for corn, think about doubling essentially the corn production in this country. We don't have a problem with production I think. We've essentially doubled the production of wheat in the last 20 years. The ability to produce food from our limited resource is not the issue, it's the demand. Sell our wheat and corn to China --- get it to those countries that need it so we chew down our supply.

Jeff: I think we get too caught up as a society in buzzwords and catchphrases for food vs. fuel. I think as a society we come up with these buzzwords and catchphrases. We need something to be scared of and something to rally against. It's getting in the way of reason and moving forward. We do have piles of grain on the ground, there's not a food vs. fuel issue. If we had Americans starving because there was no grain out here feeding them it might be something feasible to consider. At this point where we see millions of bushels stacked up in outdoor bunkers, it's not an issue. We as a society need to stop selling fear.

Rick: And part of that goes back to education and awareness and how we get that message out. This is an opportunity to get the message up to the policy makers.

[participant]: I would have one other suggestion, if you have any other R&D work I would suggest you include the heartland. I didn't know canola was being grown in the southern plains until I saw the graph. I don't see any R&D coming from the the southern plains. I see it going clear up ,clear around, and below but I don't see any R&D coming from where canola is actually grown here in the southern plains. If you do any more R&D please include that area in your R&D.

Rick: That's part of education awareness.

Mike Stamm: We are doing research in our region it just was not a particular part of this project. It was more stress environments they were trying to evaluate. I was a substitute PI on this project because the original PI from K-State retired in the middle of it so I inherited his piece of the project. By that time it was too late for us to initiate one of those stress trials. We incorporated the work I've been doing over the last few years into the project. Also there was a comment made of the USDA NIFA money that's coming into our region. We have a NIFA project at K-State that we've been able to maintain now for the last decade that brings approximately $180-$210,000 into Kansas State which we then distribute to our other participants in the region. Region wide there is research going on with winter canola. It's going on, maybe we need to do a better job of bringing this information to you the producers so that you can utilize it.

Rick: Has this been a reasonable forum for that sort of information exchange? Is this particular gathering unique to those others that are going on?

Mike: It's somewhat unique in that there's more entities involved in this meeting than there are in some of our producer meetings, those are heavily producer oriented. Kansas State puts on 3-4 canola schools

a year on average. Attendance can be from 15-60 depending on the enthusiasm for that crop in that particular year. It was mentioned that Canola College where we've had up to 200 participants annually which varies with the enthusiasm for the crop. I think we are doing a good job of getting the word out but again we can always do better.

Rick: Well a couple things that we've tried to include in these forums, one is workforce for a couple of good reasons. A lot of this research falls under the authority of the Biomass Research and Development Board which is seven federal agencies and the Office of the White House. The Department of Labor is not a part of that, nor is the Department of Education. Yet two of the things we hear in these forums is the need for education and awareness. Perhaps there's grant opportunities there and workforce development, workforce training which is department of labor. We're hopeful these forums bring together a larger group of players who need to be at the table if we're going to try out a pilot project to somehow enhance the bioeconomy in a given area. In this particular case relate it to a reasonable demand waiting for a little bit more supply.

[participant]: Demand for Market or demand for fuel, or demand for both?

Rick: What we're hearing at least is that the airline Industry is interested in moving this along, increasing the availability. Again how is it profitable for the producer because if the demand and the market isn't there you're not going to grow the crop. The education and awareness might be a part of that, maybe we also need additional federal and state agencies and having the economic department from the various states that have participated in these is a good step. Maybe we need to be looking at that as well, the Department of Commerce in D.C.

[participant]: So for education and awareness, I was looking at webinars or documentaries on U.S. bioenergy and specifically jet fuels. Use it at schools or the workforce and get more awareness.

Michael Brodeur-Campbell: It seems to me that the average age of the participants skewed towards the older end of the range. There was also the comment that this may be a generation-long change for wide adoption, and I believe the younger generation will be more open to change and risk-tolerance. So it might be worth some time thinking about how to reach out to the younger farmers/producers to get this information out, and get their perspective on how to proceed

Rick: Which goes back to the department of education.

[participant]: It might be a benefit if you pointed the diesel production as a cost reduction to the farmer. They don't care about airplanes they care about their bottled water. If they would be able to produce enough diesel locally to where they pay a lot less because it's their own grown product. They might be more willing to change then the excess could be funneled into the rest of it.

Rick: So what about the demand for diesel or biodiesel and what federal agencies would be interested in that as well?

[participant]: What's the possibility of having the DOD be able to take this cooperative fuel like at Junction City or here in Wichita? We are part of America's SBDC, our next year's function we will become a T state. There are 10 in the nation now. T means technology, as in technical commercialization so one of the things we're doing is an initiative working with the DOD. They have 2 needs, one is urgent, it's immediate, they just discovered. The other is an ongoing arching need that is ongoing. We want to

invite innovators to come. We want to get the word out where you can come to this event and present to the tech scouts. Your presentation is about the DOD and if you do not connect with them they will help you find where you do connect. We want to invite others and let them know that the possibility exists. The SBDC works with clients and helps them with no cost to them.

Rick: Recommendation: engage Dept., of Defense to align with one of their "Statements of need" that justifies DoD investment in alternative jet (biofuels) fuels. The ATIP Foundation has connections to the "Interagency Working Group for Technology Transfer," convened by the Department of Commerce, as well as the "Federal Laboratory Consortium for Technology Transfer" --- two groups that could be engaged to facilitate further action resulting from this forum.

Rick: How many small business development centers are there?

[participant]: Across the nation? There are small business centers across the states. All of them are paid for by the federal government who allocates a budget to each state's commerce budget. Which they use however they please.

Rick: Ok, and are you familiar with the process to apply for these grants across these states?

[participant]: Yes, All of the processes can be found on the website. Each loan or venture you are looking will be highlighted for what organization you are looking for.

Rick: What are the applications like?

[participant]: The USDA allows for immense opportunities for all groups or individuals looking into making a business or who just have an idea. All inform.

[participant]: One comment I haven't heard today… are mandates. Mandates contributed largely to the market for Ethanol emerging and I was wondering if it would be possible to do the same to emerge the BioJet or BioDiesel industries

Rick: Well that comes back to policy and I would direct that to Chris on the feasibility of that.
Chris Cassidy: Well that's a bit of a slippery slope…. On how the government can interfere in the industry. The government definitely needs to play a role in this but to what degree is the question. For starters, the food vs. fuel discussion is a question because of corporate interference. As a result we need to find a solution that is approved by the majority of people. As well we need more studies to prove that the possibility is reasonable. It will need to be a compromise but government aid in this field is possible.

Rick: I'm going to make one more comment…. From my experience in working for the USDA and doing research in this and other fields and I know that the government agencies will work tirelessly to implement new technologies and innovations and fund them in whatever capacity they need. The DOD is the best example of this because they have all of the government finances and resources as a procuring agency. Formerly, I would like to implore all of you and other agencies to explore these avenues.

[participant]: with the North Central Texas Workforce Development Board…. A few of the topics I see being brought up are "education, fundings, and marketing/awareness." Coming from the private sector

and now I work in government, one of the things I have learned is that if you're going to utilize state and federal government funds, they both respond to updated information using the “hot language” of the time. You have mentioned that this initiative and others will all need funding from government grants and in my experience it is ‘hitting the hot buttons” and really striking while it’s there. For example, everyone should know what WIOA is (Workforce Innovation & Opportunity Act) . This is the first legislation aimed directly at bettering the workforce and each state has funds from this act. To get and keep sustainable projects such as this one (biofuel), you will need the workforce to be developed too. That means education programs starting at the 8th grade and up. That creates awareness of the industry and it’s innovation. Also tapping into new federal/state programs (grants) that can help with bringing existing businesses into the future by funding equipment upgrades, etc. Every state, including Kansas has it’s own workforce development board so make sure to partner with them, to maximize everything they offer and that you’re entitled to as an employer, educator, and as an American worker.

Rick: Well it was Mineral Wells, TX, who had that extremely successful ad campaign on the opportunities which they provide.

[participant]: Yes

Rick: The CEO of the ATIP Foundation (Wes Jurey) is the state chair of workforce development investment board.

[participant]: Well yes … so he does approve all of our budget and mission goals.

Rick: So he has a lot of say in how the agencies are utilized. Correct?

[participant]: Absolutely, and all of his counterparts which means you have to ‘hit all of the hot buttons’ to make sure they stay interested in your project. Right now, it’s “Sustainability, Job Creation, Environmental awareness, and Education (Career Pathways).”

Rick: and again the value of the forum is important to bring all of these groups of people with different backgrounds to discuss these types of important topics.

Rick: Thanks everyone, tells people at the forum the future plans for the meeting notes and adjourns the event.