Governor's Council on Biofuels

Agenda for March 17, 2020

10:00 a.m.

Welcome and introductions
Commissioner Thom Petersen, Minnesota Department of Agriculture (MDA)

10:05 a.m.

Council comments on Jan. 27 meeting notes
Commissioner Petersen

10:10 a.m.

Overview of Council workplan and schedule going forward
Bob Patton, Energy and Environment Supervisor, MDA

10:25 a.m.

Open Meeting Law
Chris McNulty, Data Practices Manager, MDA

10:45 a.m.

Biofuels and engines
Bruce Jones, PhD, Director, Minnesota Center for Automotive Research (MnCAR), Minnesota State University, Mankato

11:15 a.m.

Ethanol efficiency gains and benchmark data
Connie Lindstrom, Senior Biofuels Analyst, Christianson PLLP, CPAs & Consultants

11:45 a.m.

Public comment and questions

12:00 p.m.

Adjourn

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DRAFT 2/12/2020

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Governor's Council on Biofuels

Meeting No. 1

Monday, January 27, 2020
2:00 to 4:30 p.m.
Orville Freeman Building
625 Robert Street North
St. Paul, Minnesota
Room 144

Meeting Notes

Council members in attendance:

Gary Anderson, Michael Bull, John Christianson, Elizabeth Crow, Tim Gross, Chris Hanson, Rick Horton, Kevin Lee, Lance Klatt, Jeanne McCaherty, Mick Miller, Kevin Paap, Brian Thalmann, Gary Wertish, and Bob Worth.

Agency commissioners in attendance:

Commissioner Thom Petersen, Minnesota Department of Agriculture (MDA); Commissioner Margaret Anderson Kelliher, Minnesota Department of Transportation (MnDOT); Commissioner Steve Kelley, Minnesota Department of Commerce (Commerce); Assistant Commissioner Craig McDonnell representing Commissioner Laura Bishop, Minnesota Pollution Control Agency (MPCA).

Presenters:

Governor Tim Walz (by phone); MDA Deputy Commissioner Andrea Vaubel; Commerce Government Relations Director Jonathan Kelly, Randall Doyal, CEO of Al-Corn Clean Fuel; and Mike Youngerberg, Senior Director of Product Development & Commercialization for the Minnesota Soybean Research & Promotion Council.

Welcome & Introductions

The meeting was begun at approximately 2:00 p.m.

MDA Commissioner Thom Petersen welcomed the Council members and audience and introduced Governor Tim Walz, who spoke via telephone. Governor Walz provided opening remarks.

At Commissioner Petersen's request, Council members introduced themselves and stated their reasons for being part of the Council. Audience members also introduced themselves.

Overview of Executive Order & Current Status of Relevant Statutes

Deputy Commissioner Vaubel and Government Relations Director Kelly gave a presentation overviewing Executive Order 19-35 and relevant statutes.

Biofuels Industry Overview

Randall Doyal provided an overview of the ethanol industry and Mike Youngerberg provided an overview of the biodiesel industry.

Council Topics and Future Meetings

At Commissioner Petersen's request, Council members provided comments on what stood out from the Council-member comments compiled from survey results, and on topic members want the Council to consider. Following is a summary of comments by Council members:

Ideas were presented on information needs and possible presentations for the Council. Ideas included:

- What other states are doing in biofuels
- Recent Minnesota efforts and policy discussions, such as the MnDOT report, Decarbonizing the Transportation Sector, and discussions on a Midwest Clean Fuels (low-carbon fuel standard)
- Detailed overview of the biofuels sector, including all biofuels, including advanced, all feedstocks, current technologies, efficiencies, and environmental characteristics
- The state of current policy, including the freedom of Minnesota to act given federal policy constraints

A comment was made that the Council should consider holding a joint meeting with the Sustainable Transportation Committee that has been established by the Department of Transportation.

Policy options and potential areas of recommendation mentioned included:

- Moving to E15 and other higher ethanol blends
- Conducting an E30 fleet demonstration
- Informing and educating the public about biofuels, including up-to-date information on efficiencies and environmental advances
- Better marketing of biofuels
- Improved retail and wholesale infrastructure for distribution of today's and tomorrow's biofuels
- How to move forward with continued improvement in environmental performance in plants and in production of feedstock

Open Time for Public Comments

There were no comments from the public in attendance.

Wrap-Up & Adjourn

The meeting was adjourned at approximately 4:30 p.m.

Workplan and Schedule

Bob Patton| Energy and Environment Supervisor

March 17, 2020

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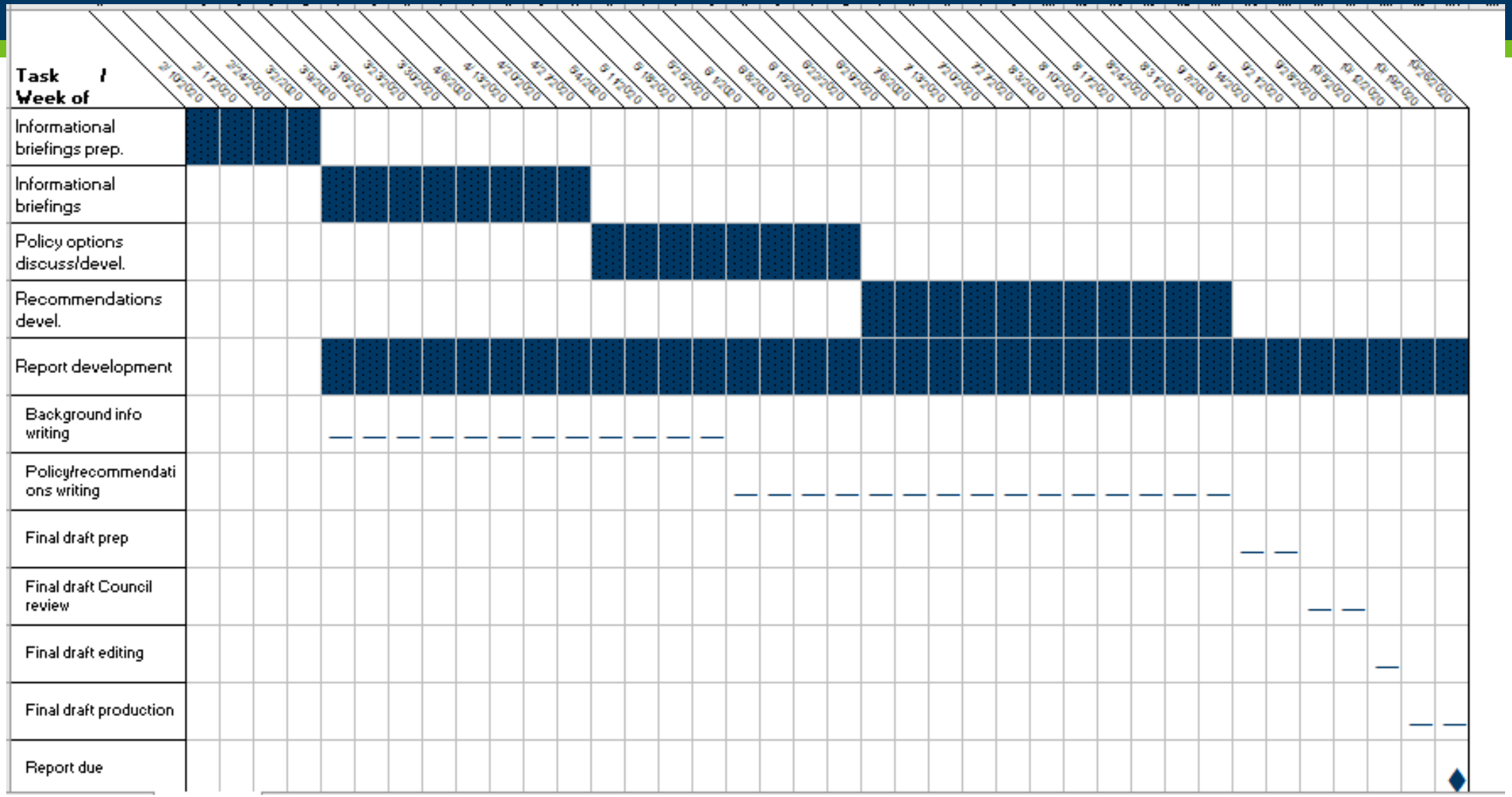
Timeline


Task
Week of
Informational briefings prep.
Informational briefings
Policy options discuss/devel.
Recommendations devel.
Report development
Background info writing
Policy/recommendations writing
Final draft prep
Final draft Council review
Final draft editing
Final draft production
Report due

Broad informational topics

- Open Meeting Law
- In-depth overview of the biofuels sector, including long-term future
- Overview of biofuels policy

Biofuels overview possible topics

- Production
- Consumption
- Emerging fuels
- Efficiency trends (energy balance, water use in plants, carbon intensity)
- Environmental effects
- Feedstocks
- Byproducts
- Co-benefits

Biofuels presentations planned so far

- Biofuels and engines (March 17)
- Ethanol efficiency gains and benchmark data (March 17)
- Relative environmental effects of ethanol, gasoline, and electricity(April 6?)
- Carbon intensity of feedstock (April 6?)

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Questions?

Bob Patton

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Governor’s Council on Biofuels – March 17, 2020

Chris McNulty – MDA Data Practices Manager

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Open Meeting Law

- Minnesota Statutes, Chapter 13D
- With limited exceptions, all meetings of public bodies must be open to the public
- **Key elements:**
  - 3 types of meetings
    - Varying notice requirements
  - Phone/Electronic meetings permitted
    - Requirements must be met
  - Need statutory authority to close meetings
    - Law sets out both mandatory and permissive closures

What is a “meeting” under the law?

- **The “quorum” rule**
  - *Moberg v. Independent School District No. 281*, 336 N.W.2d 510 (Minn. 1983).
  1. Quorum (majority) or more of full public body, or quorum of any of the public body’s committees, subcommittees, etc.;
  2. Discusses, decides, or receives information as a group on issues relating to its official business
- **Gatherings not subject to OML:**
  - Social gatherings
  - Trainings/team building
  - …assuming no official business is discussed

Practical Pitfalls

- **Email / Phones / Social Media**
  - Quorum discussing official business over email or phone = meeting
    - Commissioner of Admin Ad. Op. 09-020
  - Use administrator as central contact point to avoid forming quorum
  - Avoid “reply all” to discuss official business
  - Avoid engaging on social media
  - Save discussion for meetings
- **Serial Meetings**
  - Meetings of groups of less than a quorum to avoid public hearings or reach agreement on an issue
    - *Mankato Free Press v. City of N. Mankato*, 563 NW 2d 291 (Minn. App. 1997)

Other considerations

- **Voting:**
  - All voting results must be recorded in a journal that is available for public inspection
  - For electronic/telephone meetings, votes must be conducted by roll call
  - Individual members' votes recorded for each appropriation of money
- **Members' printed materials**
  - Copy of materials viewed by Council must be made available to public at meeting
  - Data Practices Act applies – redact if necessary

Data Practices Issues

- **Public bodies may discuss not public data in an open meeting without liability when:**
  - The disclosure relates to a matter within the scope of the public body's authority and
  - Is reasonably necessary to conduct the business or agenda item before the body
- **Data retain original classification**
  - However, a "record of the meeting" is public
  - Council has discretion on what is, and what goes into, the "record"
- **Data on Appointed Officials** (Minn. Stat §13.601)
  - Correspondence – presumptively public
  - Application data – mostly public
  - Complaint data

Penalties

- Intentional violation (Minn. Stat. § 13D.06, subd. 1)
  - Personal liability – $300 fine
- Three intentional violations (Minn. Stat. § 13D.06, subd. 3)
  - Forfeit office
- Reasonable costs, disbursements, attorney fees (Minn. Stat. § 13D.06, subd. 4)
- No reversal of public body actions taken while in violation of the law

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Questions?

Chris McNulty

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651-201-6435

MINNESOTA STATE UNIVERSITY
MANKATO

Biofuel Research at MnCAR

Minnesota Center for Automotive Research
Minnesota State University, Mankato

Dr. Bruce Jones, PhD

MnCAR
Minnesota Center for Automotive Research

Small Non-Road Engine Challenges (SNRE)

- Seasonal use by consumers
- Long term seasonal storage
- Carburetor equipped engines
- Wide range of uses
- 2-stroke, 4-stroke, and hybrid applications
- Safety
- Engine to engine variability
- Cost

MinnesotaCorn GROWERS ASSOCIATION

Performance Study

Fuels

- E0, E10, E15, E20
- Non-oxygenated 91 octane pump fuel
- Splash blended with E95
- Emission testing performed on Tier-II EEE

Engines Tested

- **Emissions Durability Period (EDP)**

- **Handheld**
  - 16 4-stroke oil bath crankcase leaf blowers (125 hr EDP)
  - 24 2-stroke trimmers (50 hr EDP)
  - 24 4-stroke premix hybrid leaf blowers (300 hr EDP)

- **Non-handheld**
  - 16 Briggs & Stratton 5.25 ft./lbs L-Head (125 hr EDP)
  - 4 Honda GC160 OHV gensets (125 hr EDP)

Measurements

- **Operability & Performance**
  - Power / torque output
  - RPM and stability - Idle & WOT
  - Acceleration & load pickup
  - Multi-position performance
  - Hot start & hot restart performance

Measurements (Cont'd)

- **Temperatures**
  - Intake
  - Cylinder head
  - Exhaust gas
  - Exhaust surface (if applicable)
  - Crankcase oil (if applicable)

Measurements (Cont'd)

- Durability over the EDP
- Emissions
- Crankcase oil analysis (as applicable)
- Compression
- Wear of critical components
- Fuel system material compatibility

300-Hour Leaf Blowers

300-Hour Leaf Blowers

- **4-stroke engine that uses premix**
  - < No crankcase oil
- **All 12 made it through the 300 hr EDP**
- **Aging cycle**
  - < 17 minutes wide open throttle
  - < 3 minutes idle
  - < Blower used to load the engine

300-Hour Blower EDP Conclusions

- No differences in wear
- Small temperature variations
- Small RPM variations
- No difference in multi-position operation
- Higher blends had more carbon build-up
- High quality engine seemed to be less affected

Storage Study

Fuels

- **E0, E10, E15, E20**
- **Fuel analysis**
  - D4814 – E0, E10, E15, and E20
  - D4806 – Blending ethanol E95
  - Performed at initial and 1 year periods

Engines Tested

- 32 2-stroke leaf blowers (50 hr EDP)
- 32 4-stroke gensets (125 hr EDP)

Measurements

- **Operability & Performance**
  - Power output
  - RPM and stability - Idle & WOT
  - Acceleration & load pickup
  - Multi-position performance
  - Hot restart performance

Measurements (Cont'd)

- **Temperatures**
  - Intake
  - Cylinder head
  - Exhaust gas
  - Exhaust surface
  - Crankcase oil (if applicable)

- **Fuel system material compatibility**

Test Plan Overview

- Engine preparation, inspection, install thermocouples
- Break-in on E0
- Random fuel assignment
- Initial performance test
- Store 6 months (2 of each fuel remain for 12 months)
- 6-month performance test
- Store 6 months
- 12-month performance test
- Fuel system disassembly and inspection

2-Stroke Blowers

2-Stroke Blower Carburetor After 12 Months

- S33 E0

2-Stroke Blower Carburetor After 12 Months

- S26 E10

2-Stroke Blower Carburetor After 12 Months

- S6 E15

2-Stroke Blower Carburetor After 12 Months

- S16 E20

Storage 2-Stroke Blower Conclusions

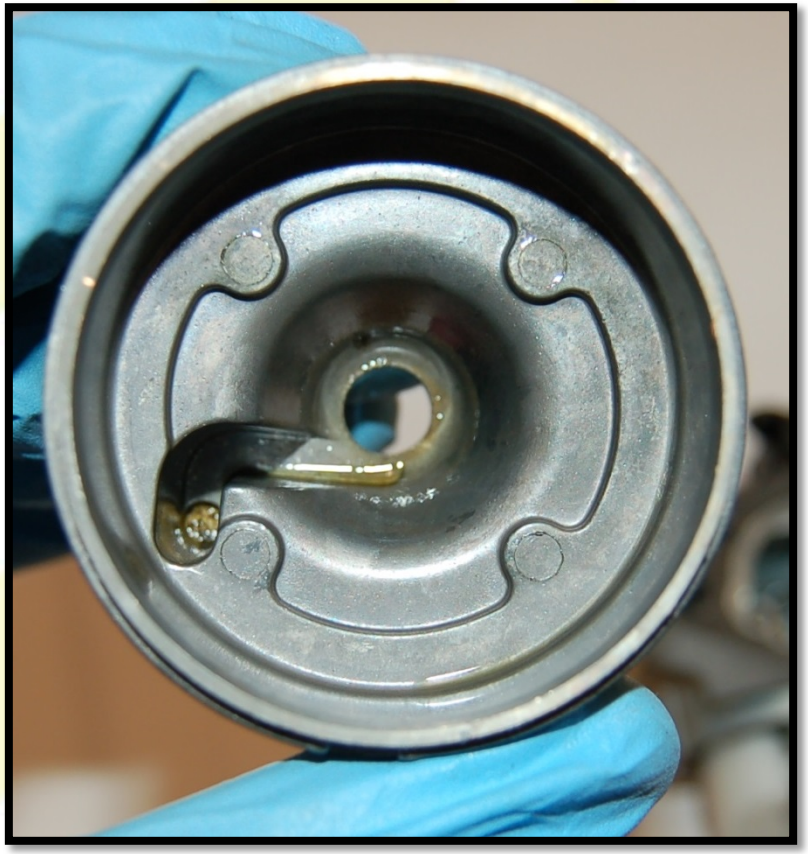
- The higher ethanol content affected the engines
- Large RPM variations at the end of the study
- Multi-position operation was affected
- Metal fuel components showed signs of pitting as well as buildup as ethanol content increased

4-Stroke Gensets

4-Stroke Genset Carburetor After 12 Months

•G1 E0

4-Stroke Genset Carburetor After 12 Months



- G18 E10

4-Stroke Genset Carburetor After 12 Months

- G27 E15

4-Stroke Genset Carburetor After 12 Months

- G8 E20

4-Stroke Genset Storage Conclusions

- Engines seemed to be less affected by ethanol than the 2 stroke blowers
- No noticeable performance loss
- Metal fuel components showed minimal signs of pitting but had some buildup as ethanol content increased

Conclusions

- **Engine to engine variation can be large with SNREs**
- **Engine quality seems to have the biggest impact on the affects**
  - < low end consumer verses professional equipment
- **E15 and E20**
  - < Increased temperatures
  - < Slowed acceleration/ reduced power
  - < Increased carbon build-up
  - < Increased fuel system corrosion during storage
- **More research needed**

BioDiesel

- RICE NESHAP Reciprocating Internal Combustion Engines National Emission Standards for Hazardous Air Pollutants
- Applies to stationary gensets used for peak power shaving.
- CO emissions reductions
- Would B100 bring older units into compliance?

BioDiesel

- The average reduction in CO emissions of the units tested in the study was 41%
- B100 could be used on some engines to be compliant under RICE NESHAP rules.
- Two of the five engines in the study did not meet standards when fueled with B5 and when fueled with B100 were in compliance.

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CPAs & Consultants

Ethanol Efficiency Gains and Benchmark Data

March 2020

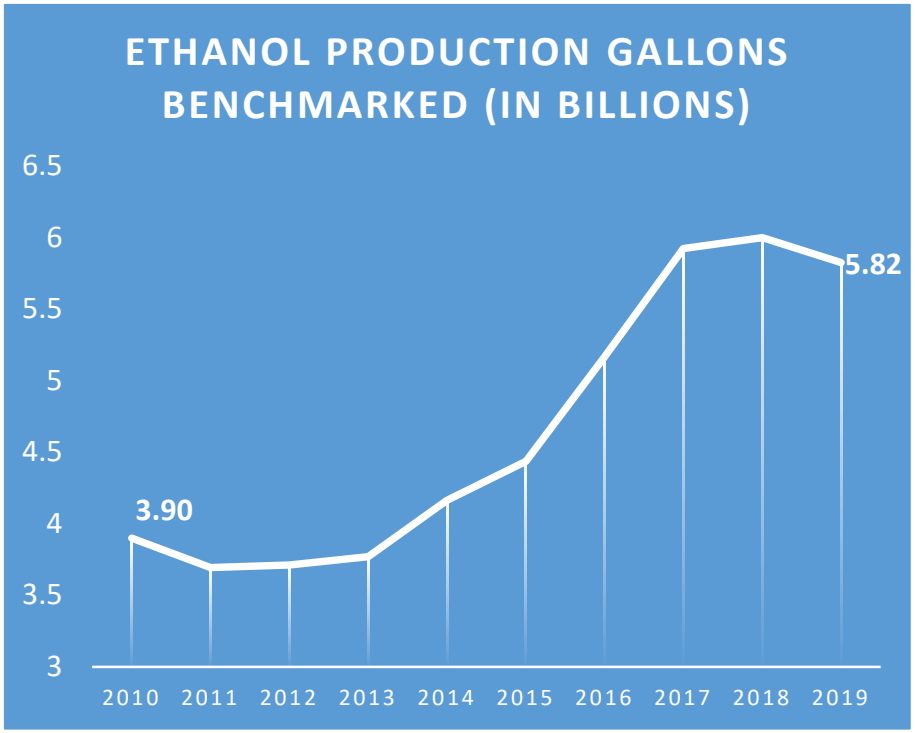
Creating clients for life

Today's Discussion

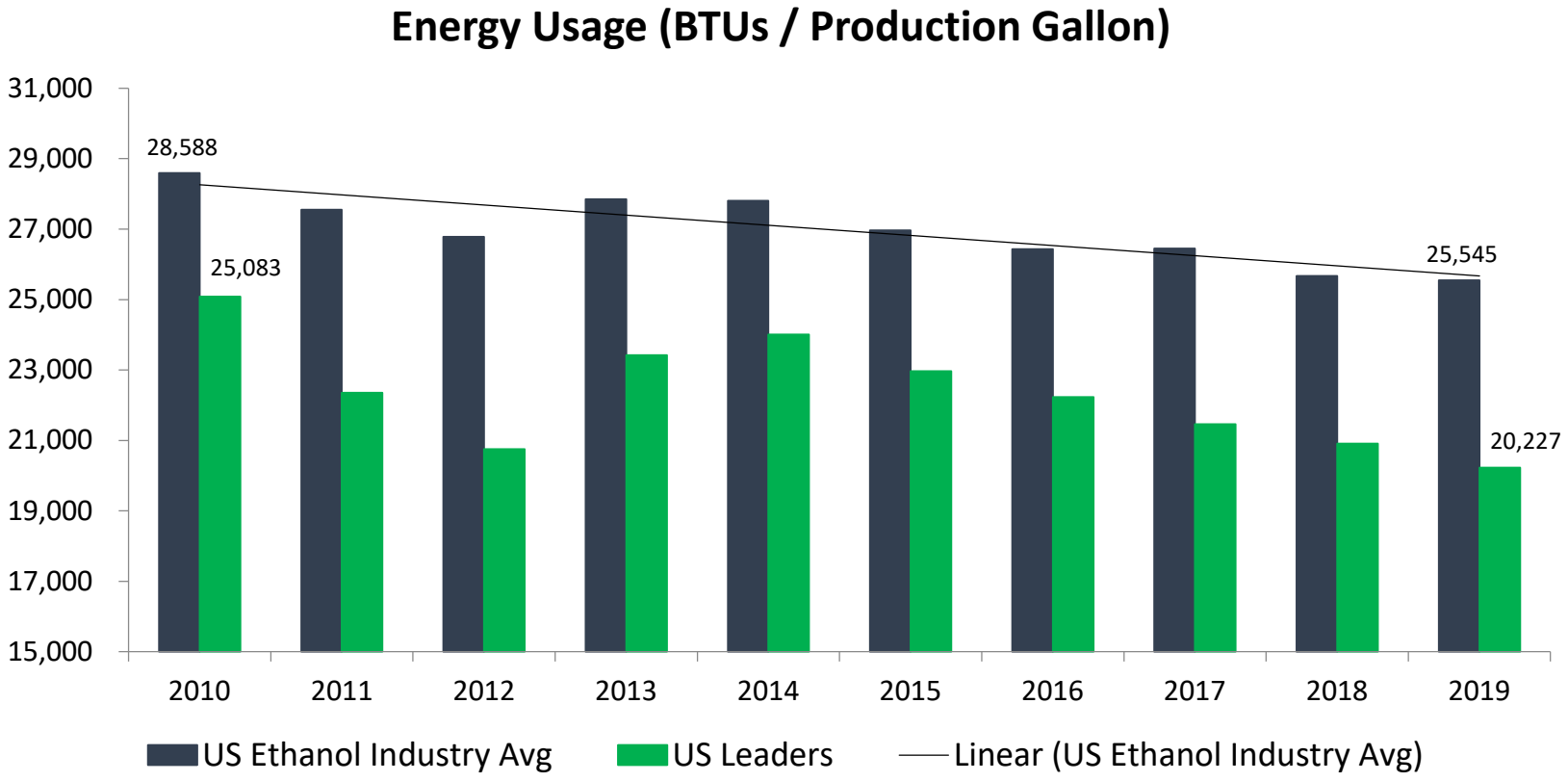
- Introductions
- Biofuels Benchmarking: how data is collected, current participant demographics
- Efficiency Metrics
  - Energy Usage and Sources
  - Electricity and Water Usage
  - Production Yields
  - Crop Inputs
- What's Next for Producers?

Biofuels Benchmarking

- Christianson Biofuels Benchmarking data represents about 35% of all US production gallons, annually since 2004
- 2019: collected data on 5.82 Billion Gallons
- Representative sample of the ethanol industry



Energy Uses and Sources



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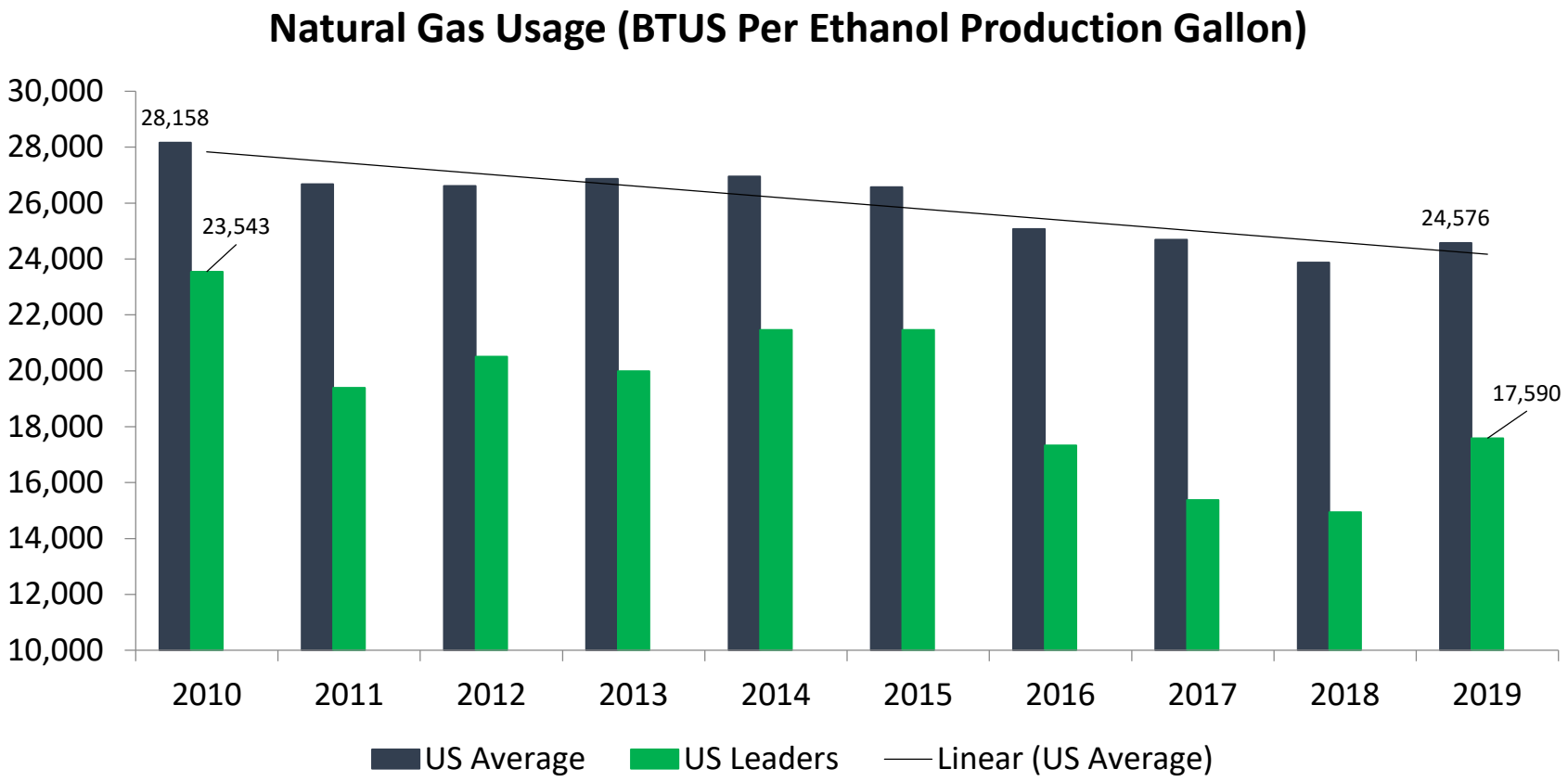

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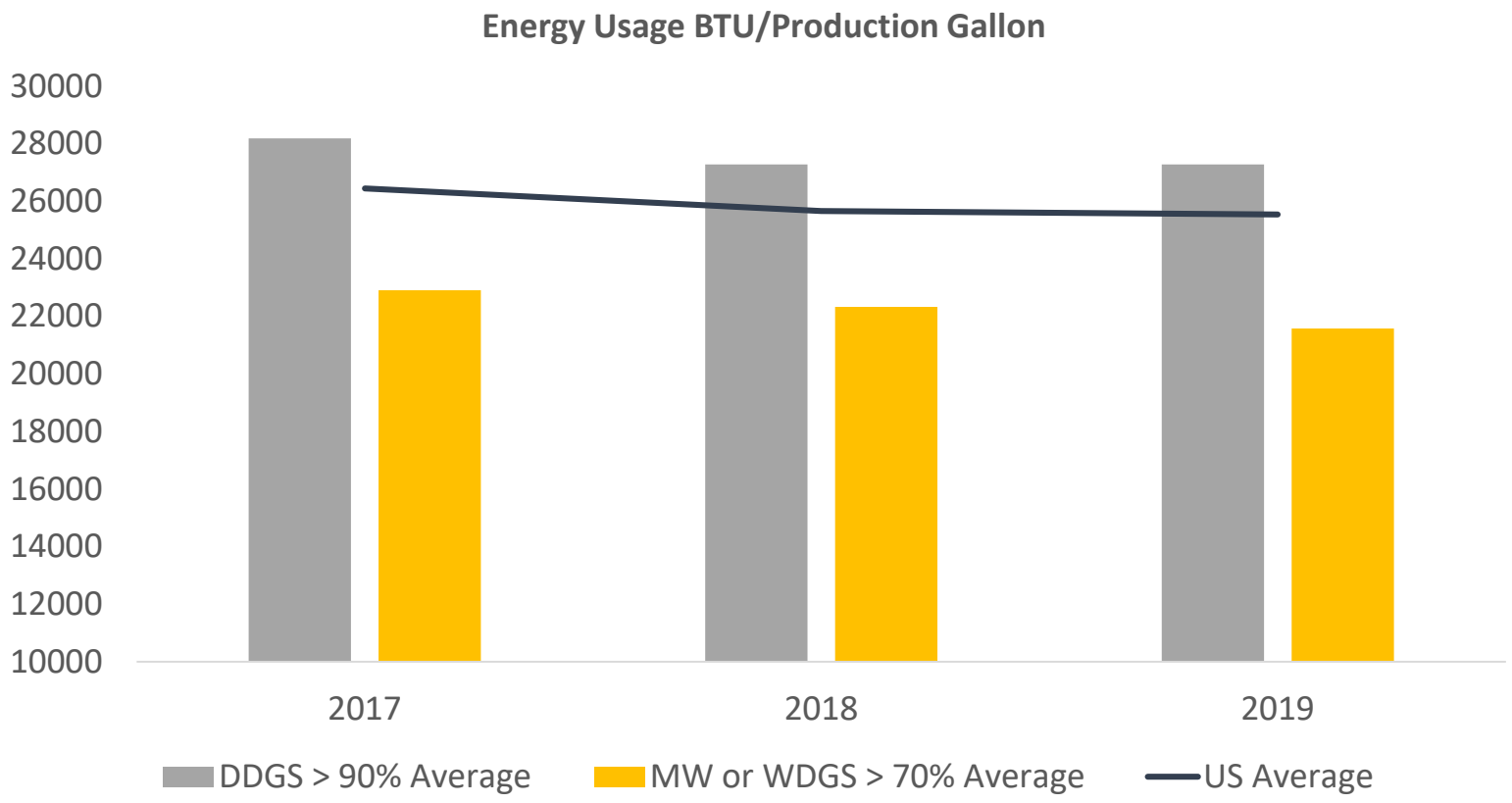
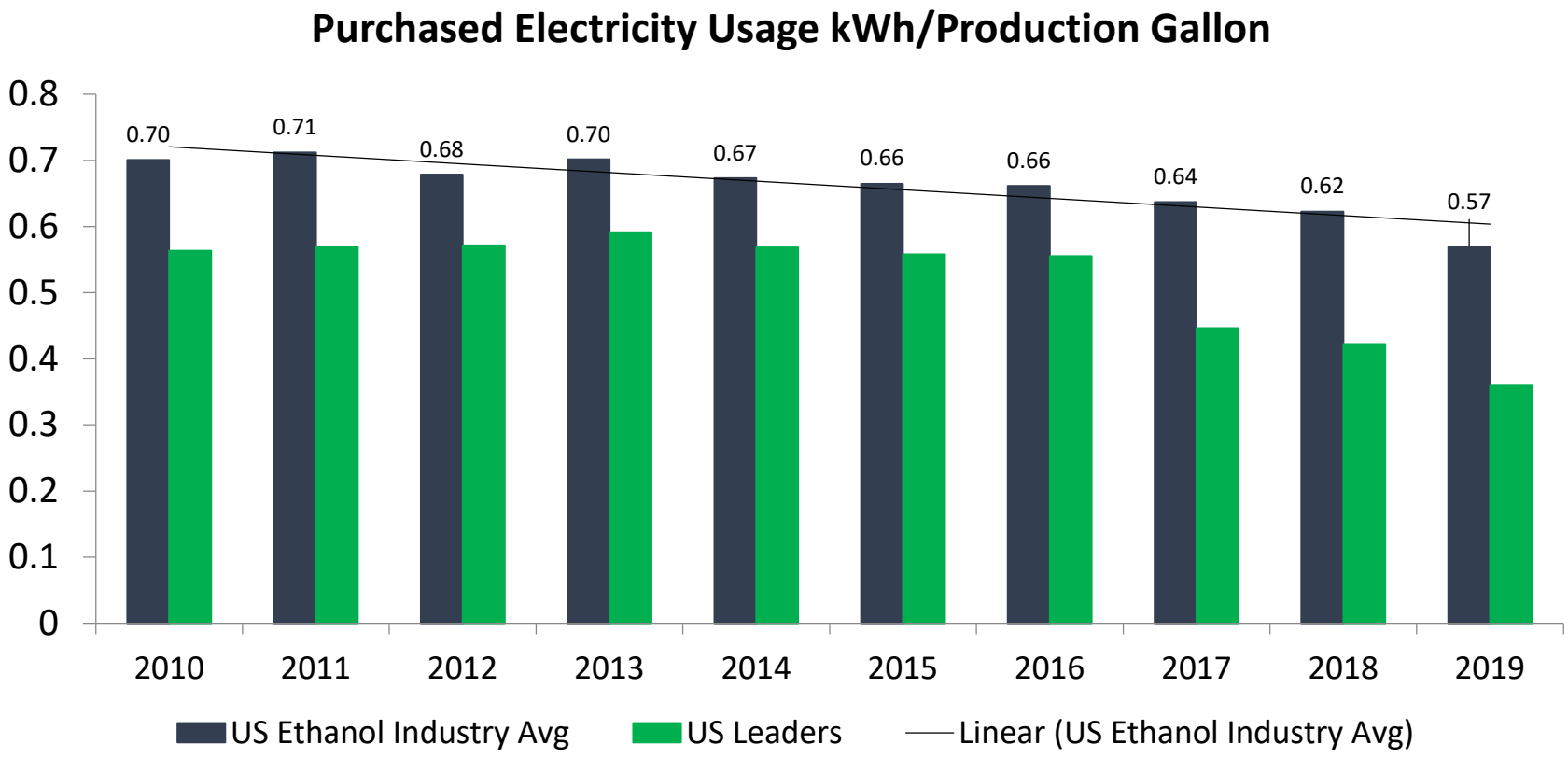


Electricity and Water Usage



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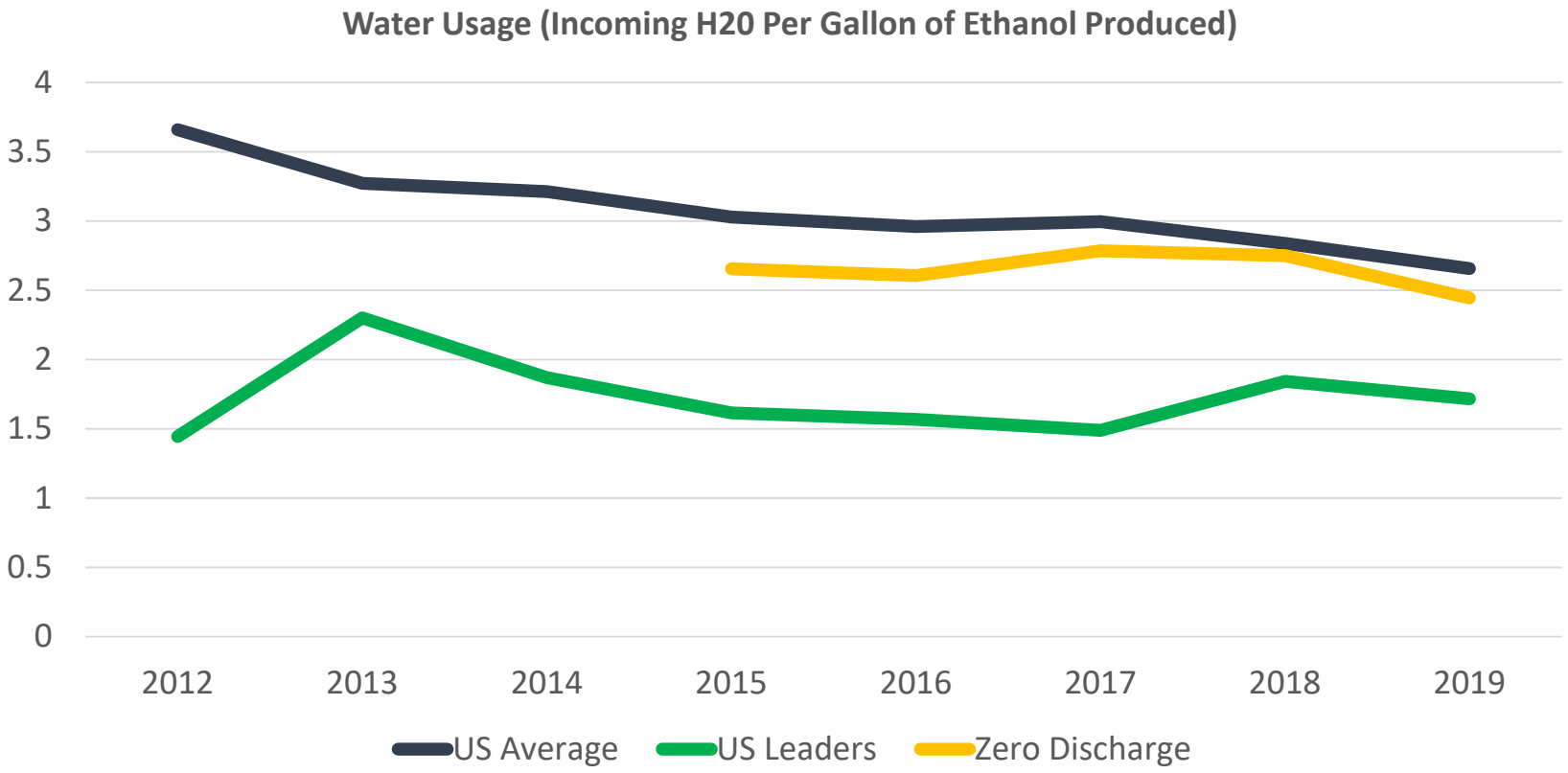
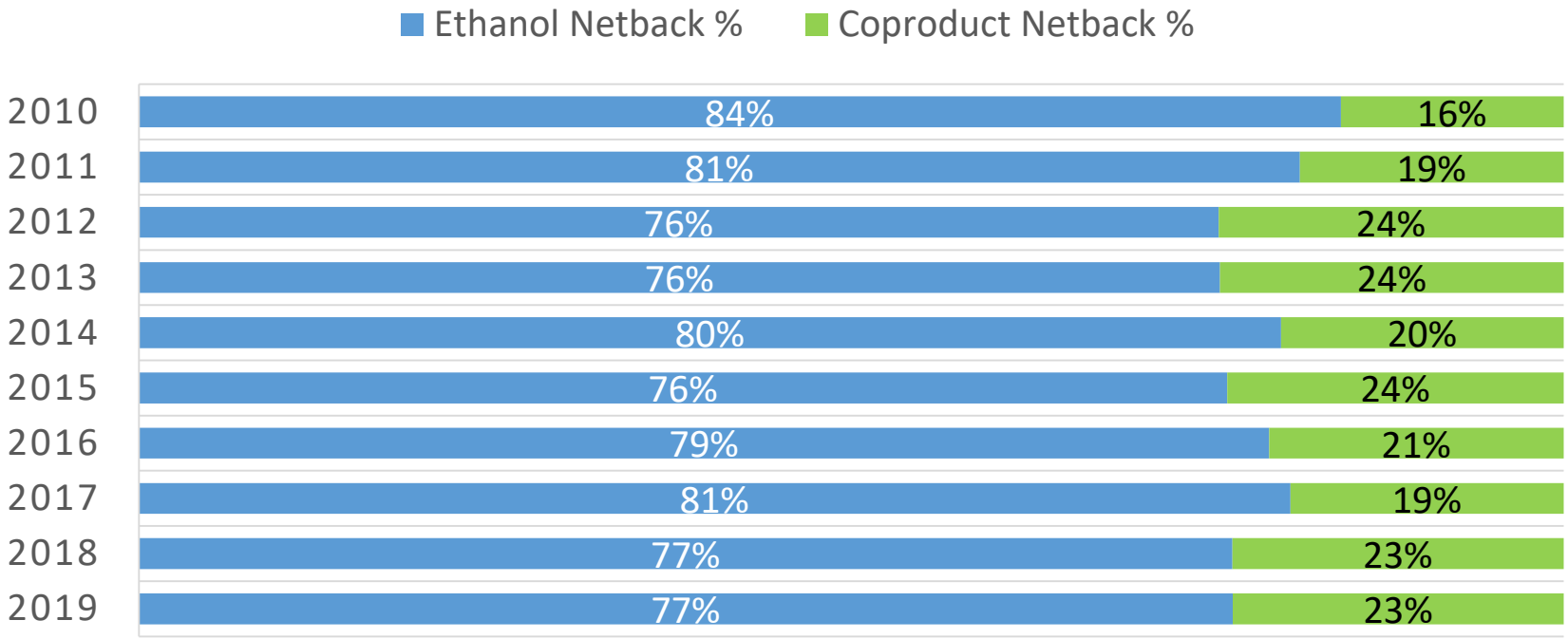


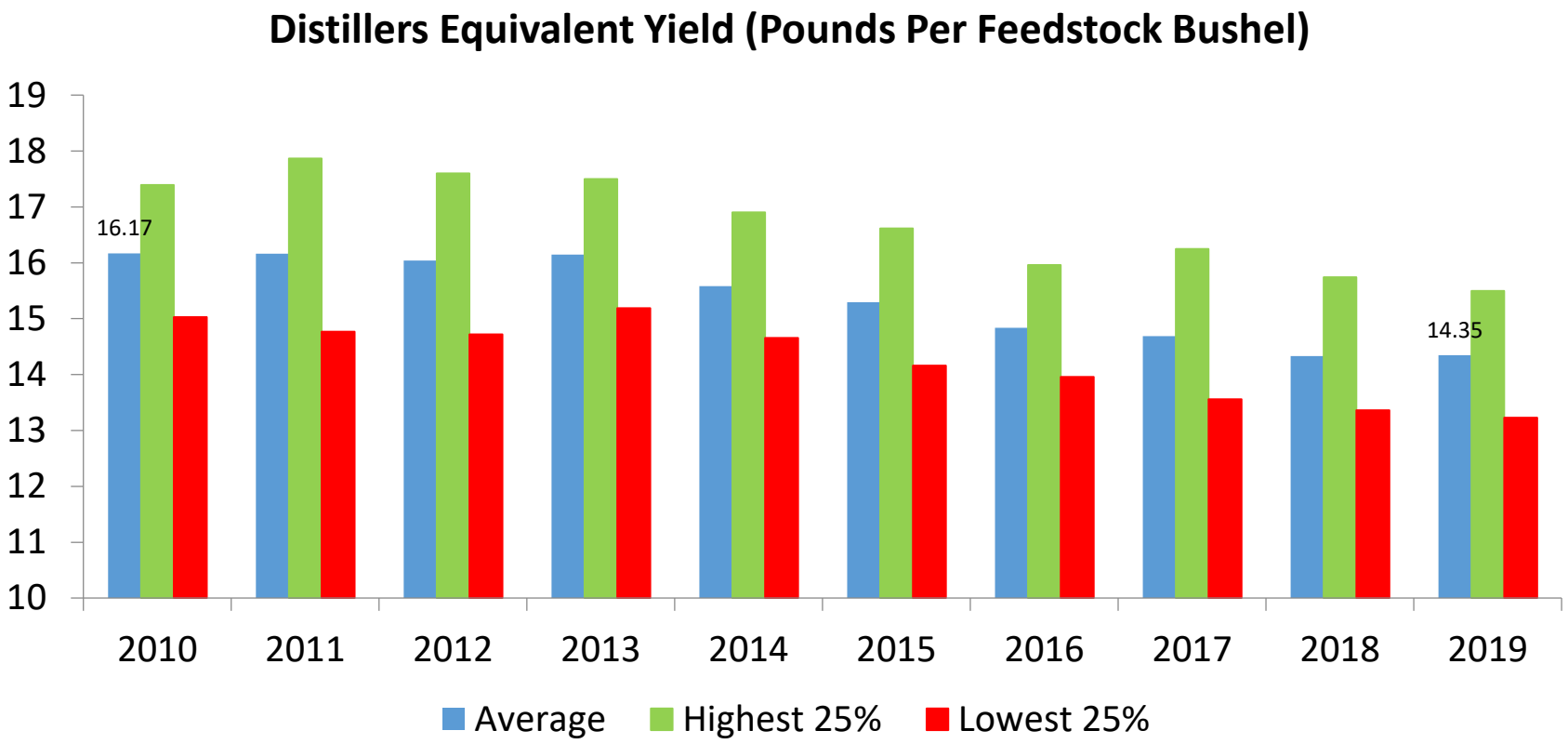
Revenue from Ethanol vs Coproduct Sales By Percentage



Each corn kernel component has separate commodity value:

- Protein (Distillers grains / livestock feed products)
- Fat (Distillers corn oil—biodiesel feedstock or livestock feed)
- Carbs (Starch—converted to ethanol)

Production Yields



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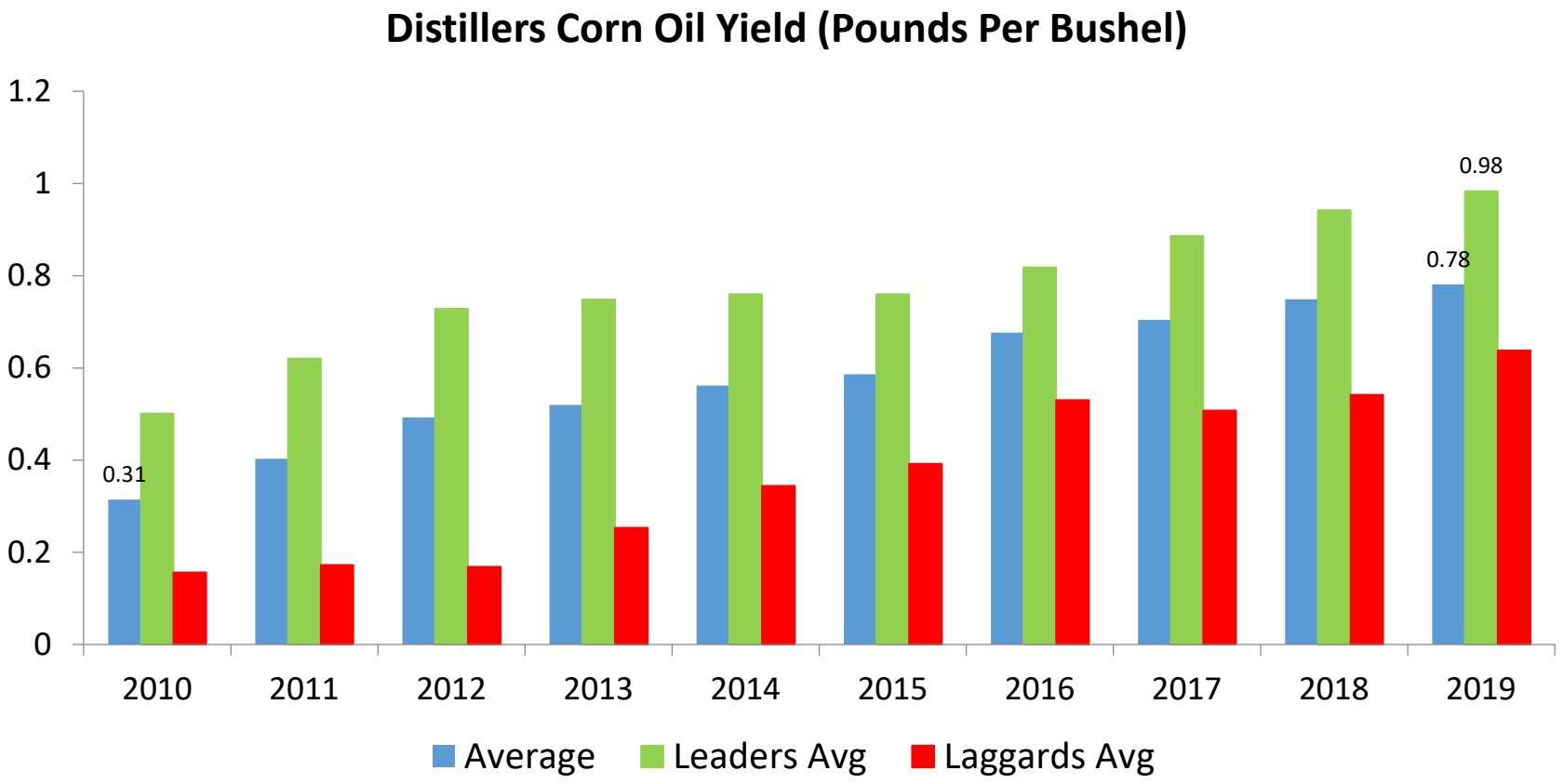
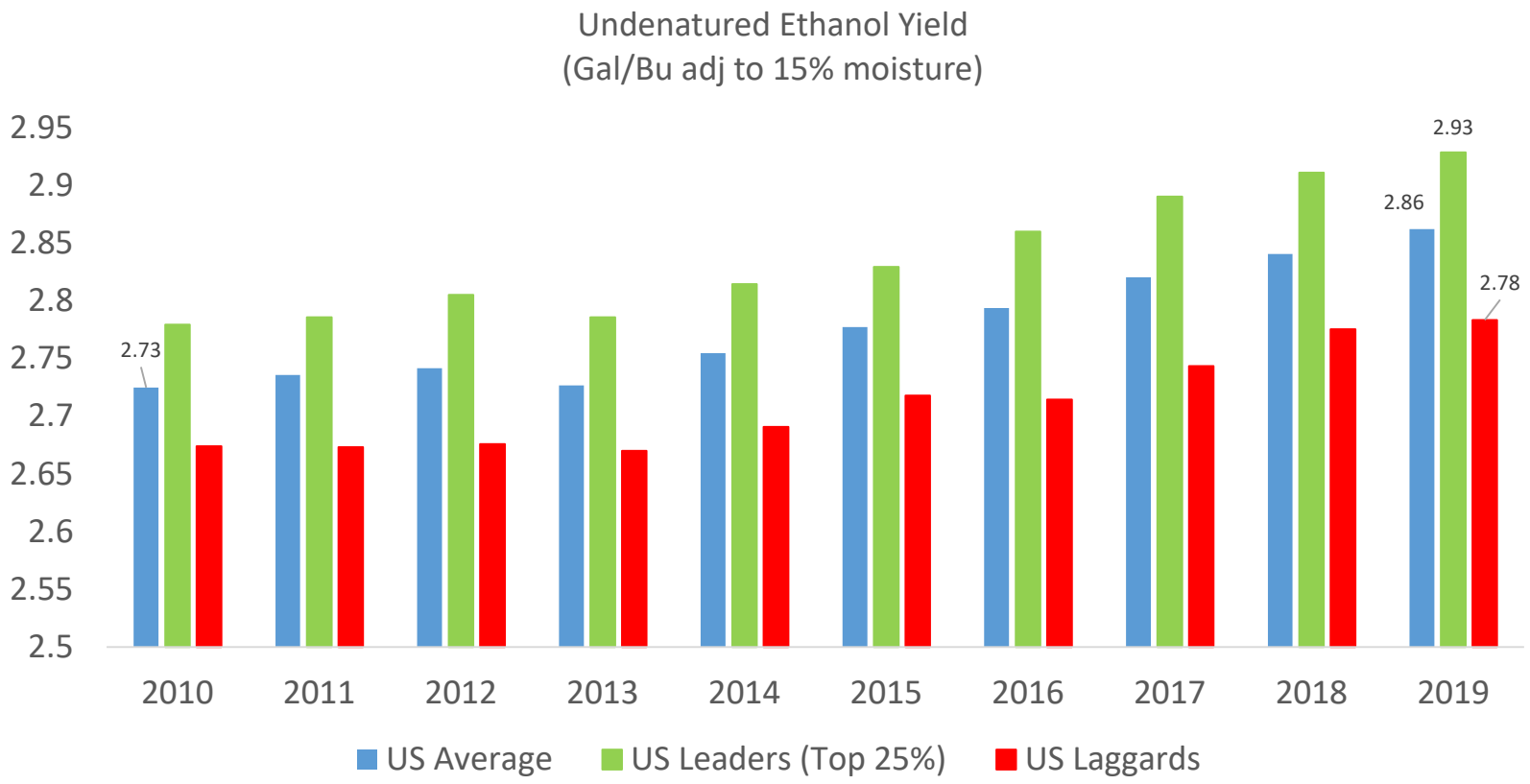


Production Yields



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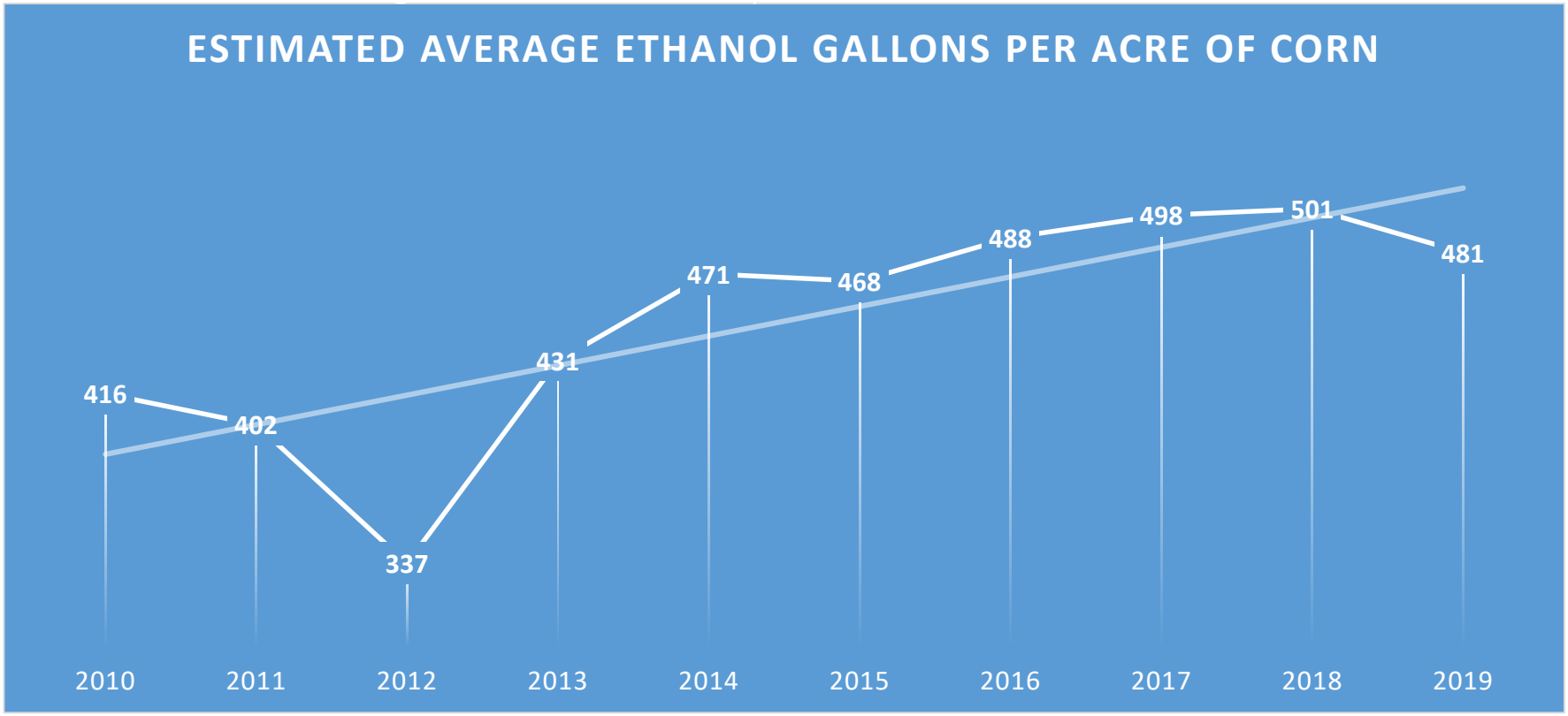
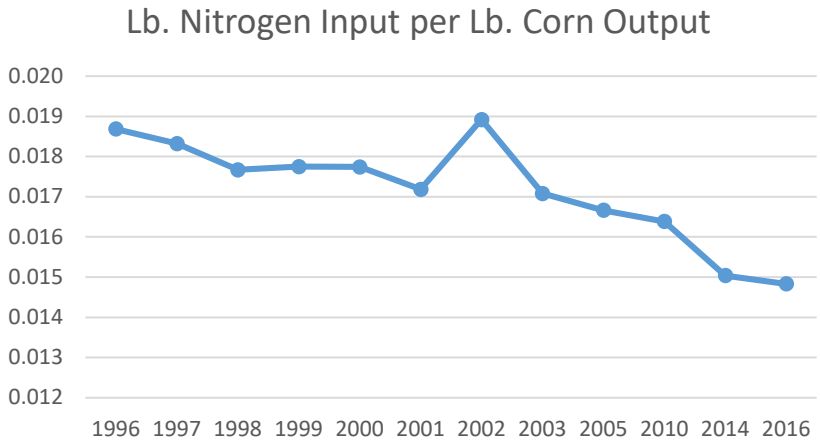
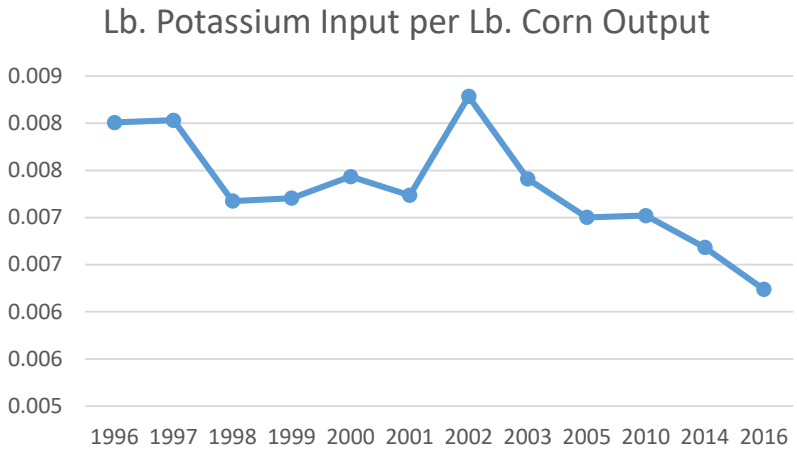
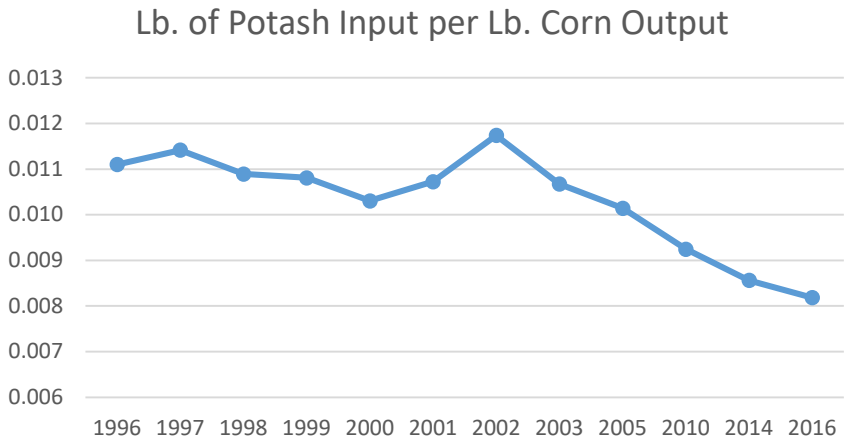


(Ethanol Data Christianson; Corn Yield data NASS)	2014	2015	2016	2017	2018	2019
US Ethanol Industry Avg Gal/Bu	2.7547	2.7772	2.7938	2.8203	2.8405	2.8621
Corn Yield Bu/Acre	171	168.4	174.6	176.6	176.4	168
Est Ethanol Gal/Acre	471	468	488	498	501	481

Farmers Continue to Produce More Corn With Fewer Inputs







Ag in general, and corn in particular, continues to improve yield with less inputs. This trend is likely to accelerate as new technologies are implemented

(Slide and data courtesy National Corn Growers Association)

What's Next for Ethanol Producers?

- Working more closely with growers to source corn
- Better data collection and availability (corn, energy for fuel vs. feed, understanding financial value of lowering carbon scores)
- Continued research to improve yields, find alternative uses for biorefinery products, and balance financial costs of energy and feedstock sources against environmental costs of these inputs.