NREL
NATIONAL RENEWABLE ENERGY LABORATORY

DOE Bioenergy Technologies Office (BETO) 2019 Project Peer Review

WBS 6.3.0.1 Biofuels Information Center

Analysis & Sustainability

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Kristi Moriarty

National Renewable Energy Laboratory

Goal Statement

- The Biofuels Information Center (BIC) task provides essential bioenergy data, information, and tools to all stakeholders. Tasks include:
  - The Alternative Fuels Data Center biofuels pages
  - The Bioenergy Atlas Google Maps based geospatial tools
  - Bioenergy Industry Status Report
  - USDA Biofuels Infrastructure Partnership Report

- The outcome of the task to enable stakeholders to make informed decisions with a specific aim to address barriers of domestic biofuel deployment.
  - Provide refueling infrastructure information, data, and costs to industry (retail station owners, automotive, agriculture, trade groups), and federal agencies .

- The task relevance is to decrease risk and increase success for biofuels stakeholders by providing key market information and costs

Quad Chart Overview

Timeline

- Start: FY2008
- Merit review cycle: FY2017-2019
- 75% complete of review cycle

	Total Costs Pre FY17	FY 17 Costs	FY 18 Costs	Total Planned Funding (FY 19-Project End Date)
DOE Funded	$610k	$500k	$200k	$220

Barriers addressed

- At-B. Analytical Tools and Capabilities for System-Level Analysis
- At-C. Data Availability across the Supply Chain
- At-G. Social Acceptance and Stakeholder Involvement
- ADO-C. Codes, Standards, and Approval for Use

Objective

- Enable stakeholders to make informed decisions with a specific aim to address barriers of domestic biofuel deployment.

End of Project Goal

- Publish USDA Biofuels Infrastructure Report
- Provide most relevant information and data on the AFDC

1-Project Overview

HISTORY

- Title II, Sect. 229 of the Energy Independence and Security Act of 2007 requires DOE to develop a "Biofuels and Biorefinery Information Center."
- Historical work included creating biofuels content on AFDC, static data and maps, and the State Bioenergy Assessment Tool.

MOTIVATION

- The Biofuels Information Center (BIC) task provides essential bioenergy data, information, and tools to all stakeholders.
  - This is accomplished through the Alternative Fuels Data Center biofuels pages; the Bioenergy Atlas tools; analysis of USDA Biofuels Infrastructure Partnership data; and publication of the Bioenergy Industry Status report.
- The task also supports industry outreach in the area of biofuel infrastructure compatibility which covers general industry inquiries and participation on industry boards and committees.
  - Examples include assisting a national association on meeting requirements in a state to allow a higher % biofuel to be sold there; working with an oil company to understand the policy process to allow their co-processed biofuel to eventually be accepted under the Renewable Fuel Standard

2-Approach Management

- **PRIORITIZE** tasks based on data availability and usage of deliverable (data, tools, webpages, reports).
- **DETERMINE** deliverable timelines based on availability of data and staff.
- **REVIEW** regularly both the budget and deliverable status to meet all deadlines.
- **COMMUNICATE** with BETO on all tasks for inputs, reviews, and notification when work is complete.
- **OUTREACH** of new content, reports, and updated tools is essential to the stakeholder community. This is done through email blasts, contacting relevant industry journals, inclusion in BETO email newsletters, or through webinars with industry.

2-Approach Management

TEAM STRUCTURE

- **AFDC updates** Kristi Moriarty updates content; Clean Cities team reviews and edits content; NREL communications edit; NREL programmer team uploads changes.
- **Biofuels Atlas/Biopower Atlas** Kristi Moriarty and Anelia Milbrandt identify new data and update existing data and budget for platform upgrades.
- **USDA BIP** Kristi Moriarty leads the effort to review data for quality, NREL programmer team uploads data to the secure database and queries the database to prepare ~75 graphics and data sets for the report. Kristi Moriarty is the sole author of the confidential and upcoming public report.
- **EERE Bioenergy Market Report** Kristi Moriarty and Anelia Milbrandt lead updating the data and content. Other NREL subject matter experts participate as needed.
- **Infrastructure Support** Kristi Moriarty works with industry by co-leading a committee, voting member of multiple committees, and board member of an industry organization.

2-Approach Technical

- **GATHER** unbiased, relevant industry data primarily from EIA, EPA, USDA, EERE projects, and industry.
- **PROTECT** USDA BIP sensitive business data using federally approved Amazon Cloud secure service.
- **REVIEW** data quality and reach out to data provider for any discrepancies, summarize data as needed or process it into geospatial data to display on mapping tools. USDA BIP entails reviewing 1,500+ spreadsheets for data quality. Ensure consistency of content and language on AFDC.
- **DEPLOY** data and information updates to websites.
- Test online tools for data accuracy and functionality.
- **INFLUENCE** industry-funded projects by leading and participating in stakeholder committees and groups.
- **SERVE** as a technical expert and respond to all industry infrastructure inquires with useful data and information to reduce barriers to biofuel market introduction.
- **LEVERAGE** funding from VTO for AFDC platform and 16 other NREL funders of the OpenCarto platform where Biofuels Atlas and Biopower Atlas reside.

2-Approach Technical

CRITICAL SUCCESS FACTORS

- Ensuring USDA BIP data accuracy.
  - Achieved by reviewing data quality to identify obvious and easy to fix errors.
  - Communicating to USDA, state partners, industry groups, and large retail station chains where data quality or omissions are impacting the overall dataset and asking for re-submittal of a correct and complete data set.
- AFDC biofuels pages and Bioenergy Atlas tools relevance
  - Update software platforms to ensure best user experience
  - Ensure content meets stakeholder changing needs overtime

CHALLENGES

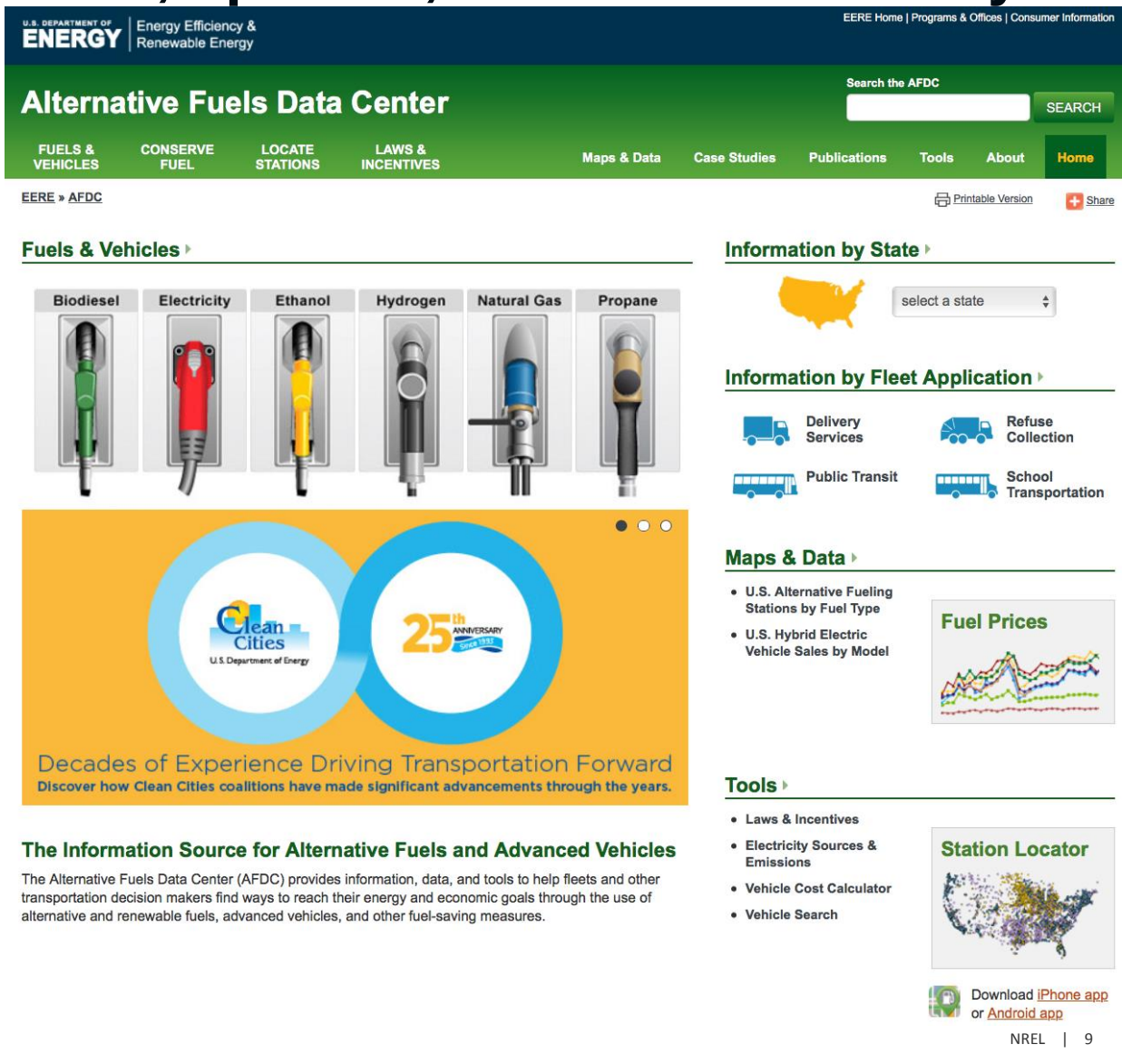
- Data confidentiality-USDA BIP data must be stored securely and the number of staff working on it limited. NREL uses DOE approved Amazon Cloud Services for sharing the data securely. It requires multi-factor authentication tied to an IP address which is challenging as USDA regularly changes IP addresses.
- Data updates rely on multiple sources and it is not always predictable when new data will become available.

3-Technical Accomplishments-Task 1-AFDC Biofuels Pages

AFDC pages are reviewed, updated, and edited annually.

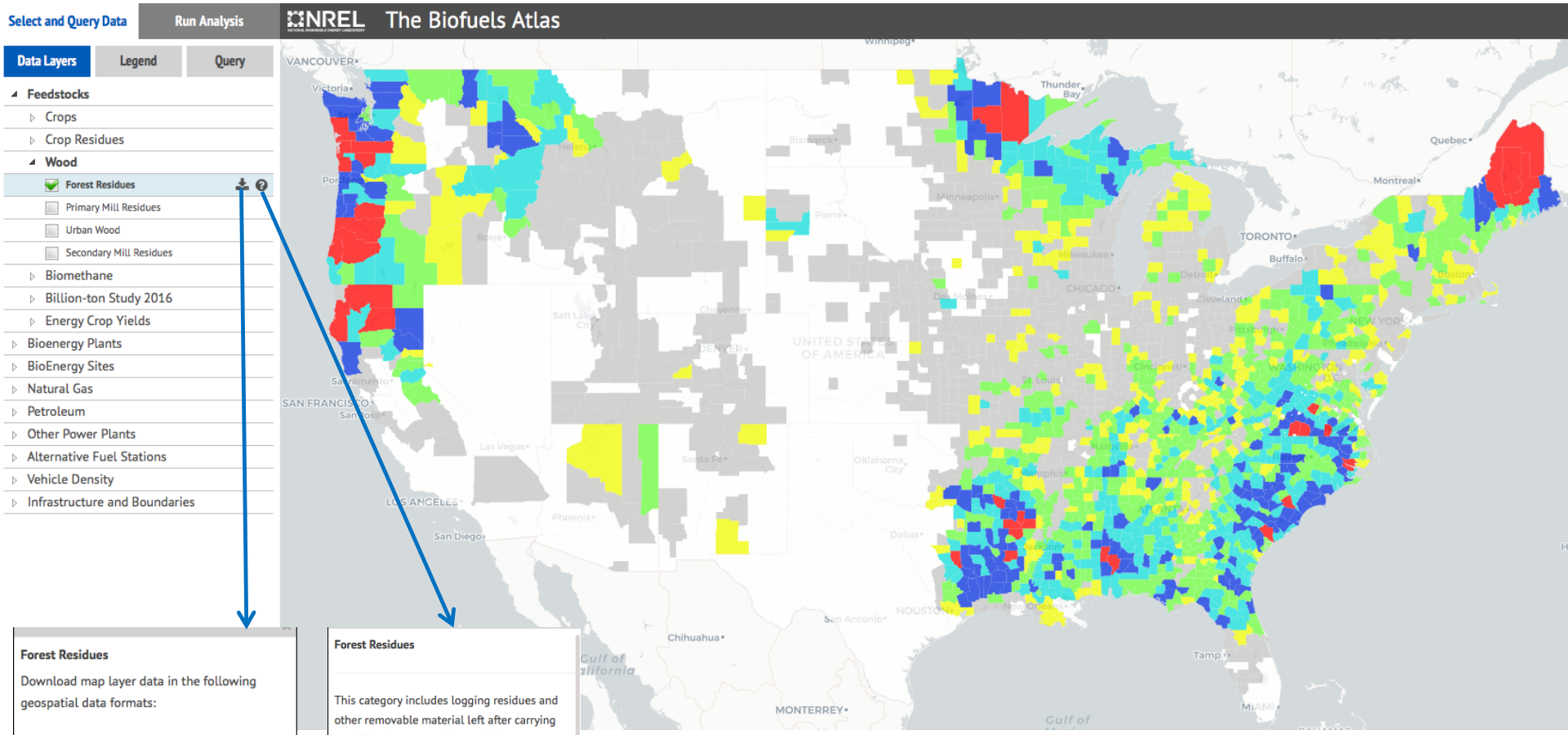
- Extensive reviews by NREL, Clean Cities leads, and communications edits
- Completed by March each year
- Ethanol (21 pages)
- Biodiesel (13 pages)
- Emerging (7 pages)
- Maps, data, and publications are updated and added as they are available.

https://afdc.energy.gov



3-Technical Accomplishments-Task 1 Bioenergy Atlas Tools

Bioenergy Atlas data is updated as new data is available; functionality is added overtime; and upgrades are made to the technical platform.



Data layers can be queried and/or downloaded. Each data layer has source, date, and link to original data.
https://www.nrel.gov/gis/tools.html

3-Technical Accomplishments-Task 1 Bioenergy Atlas Tools

Bioenergy Atlas users can estimate biofuel or biopower production in an area.

Select and Query Data | Run Analysis

Bioenergy Resource Analysis
Run an analysis on the amount of yield that can be produced in a specific area.

Incentives
Run an analysis on the incentives available in a specific area.

Results

These data show the amount of yield from each feedstock in the area you selected.

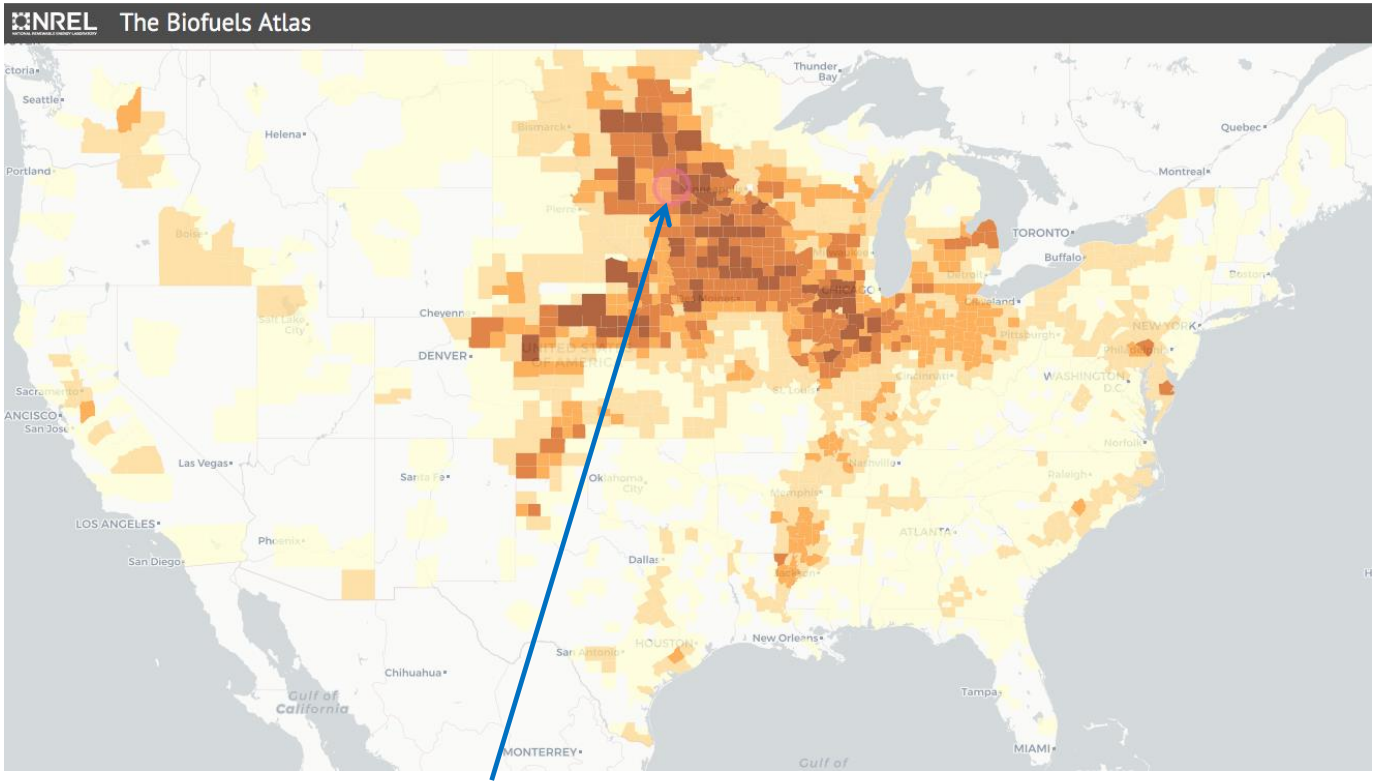
Feedstock	Dry Amt (tonnes)	Gallons	
Bagasse	0.00	0	Edit
Barley Straw	165.49	6,843	Edit
Forest Residues	321.97	10,126	Edit
Urban Wood and Sec. Mill Residues	38,370.46	1,577,026	Edit
Primary Mill Residues	504.38	20,730	Edit
Corn Stover	2,027,510.00	88,399,436	Close

Available resource: 2027510.0 tonnes/year

Expected biofuel yield: 87.2 gallons/tonne

Percent of resource obtainable: 50 %

Rice Straw	0.00	0	Edit
Sugar Beets	1,046,564.03	14,285,599	Edit
Sugarcane	0.00	0	Edit
Wheat Straw	85,726.99	3,189,044	Edit
Totals	**3,199,163.32**	**107,488,804**	



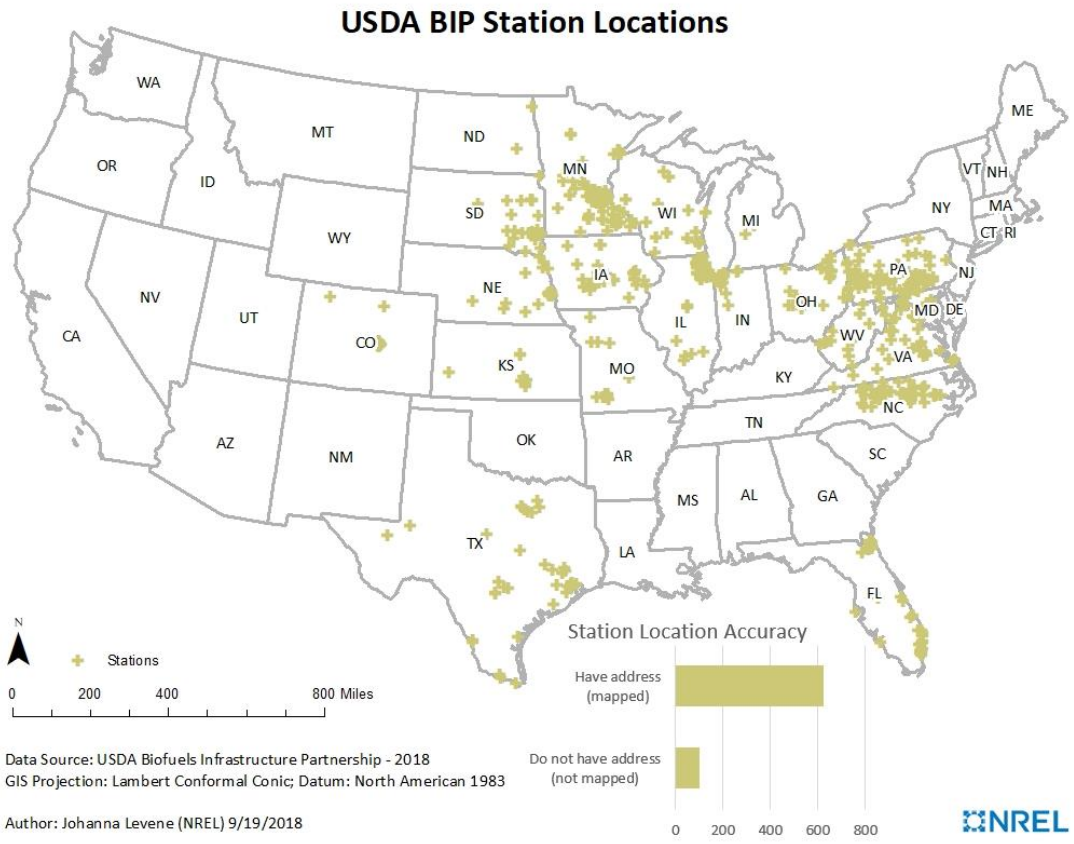
User drags a circle to select radius; feedstock data for all counties is used in calculations

Users can edit preloaded assumptions (based on theoretical ethanol yield calculator and biomass feedstock database).
https://www.nrel.gov/gis/tools.html

3-Technical Accomplishments-Task 2-USDA-BIP

Review, Analyze BIP Data and Prepare a Summary Report.

- USDA and state/industry partners invested $210 million in grants to gas stations to purchase refueling equipment to extend the availability of E15 and E85
- DOE and USDA have a memorandum of agreement to share station data including infrastructure and sales data
- NREL reviews the data, loads it to a database, and prepares graphics and a report from the data
- NREL prepared a summary report in January 2017 and September 2018 and briefed USDA staff on the status of the data
- This is a five year project.



3-Technical Accomplishments-Task 2 USDA BIP

Currently, data is confidential, this and the following slide provide information on USDA BIP data collected

- Critical to understanding the cost of adding infrastructure for a new biofuel
- Learn if stations have a tank to store a new fuel
- Understand if stations are marketing biofuel prices
- Stations ownership shows a market pathway for a new fuel

Data	Metric
Number of stations reporting	
Number of dispenser (pumps) installed	
Average numbers of pumps installed per station	
Average dispenser cost	
Number of tanks installed	
Average tank cost	
Refueling positions (# of spots where a consumer can pull in and select a fuel) E15 E85 Diesel	Before/After
Refiner/oil branded stations	
Average ethanol content in E85 (flex fuel)	
Stations with E15 on price sign	
Stations with E85 on price sign	
Source of E85 Terminal Ethanol plant	
Station ownership single owner 2-10 stations 11-50 stations 51-200 stations 201 or more stations	

3-Technical Accomplishments-Task 2 USDA BIP

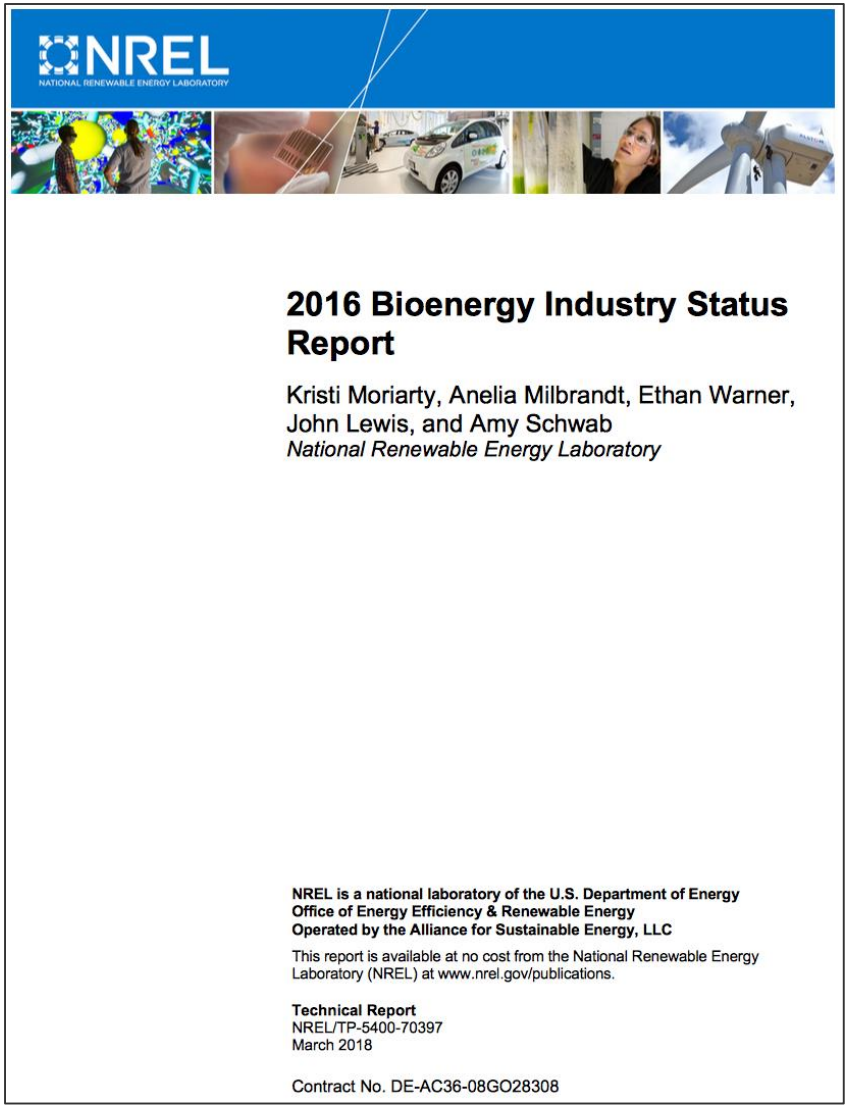
- **Stations are privately owned; one-of-a-kind data set**
- **The following sales volume and price data was collected by month for:**
  - **E10**
  - **E15**
  - **E85**
  - **Diesel**

A report intended for publication will be prepared that summarizes all the data. The report will be updated each year with the intended purpose of understanding the impacts of fuels sales after adding biofuel choices.

3-Technical Accomplishments-Task 3 Bioenergy Industry Status Report

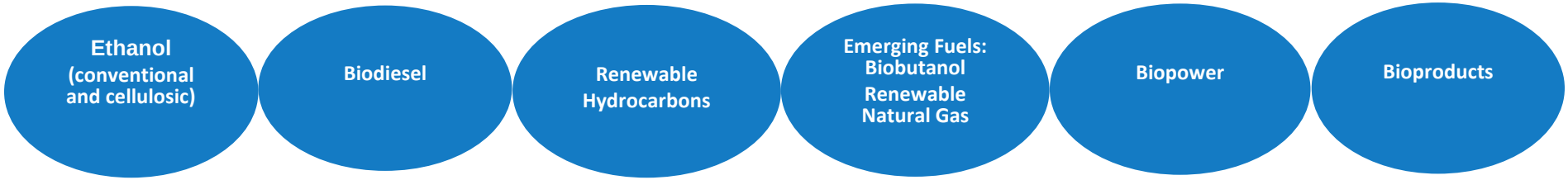
Prepare Annual Bioenergy Industry Status Report.

- Key bioenergy metrics all in one place
- Snapshot of the bioenergy industry at the end of each year.
- Compliments other EERE office market reports.
- Report expanded to cover bioproducts and renewable natural gas after the first edition
- Report covers overall size and composition of bioenergy market.
- https://www.nrel.gov/docs/fy18osti/70397.pdf



3-Technical Accomplishments-Task 3 Bioenergy Industry Status Report

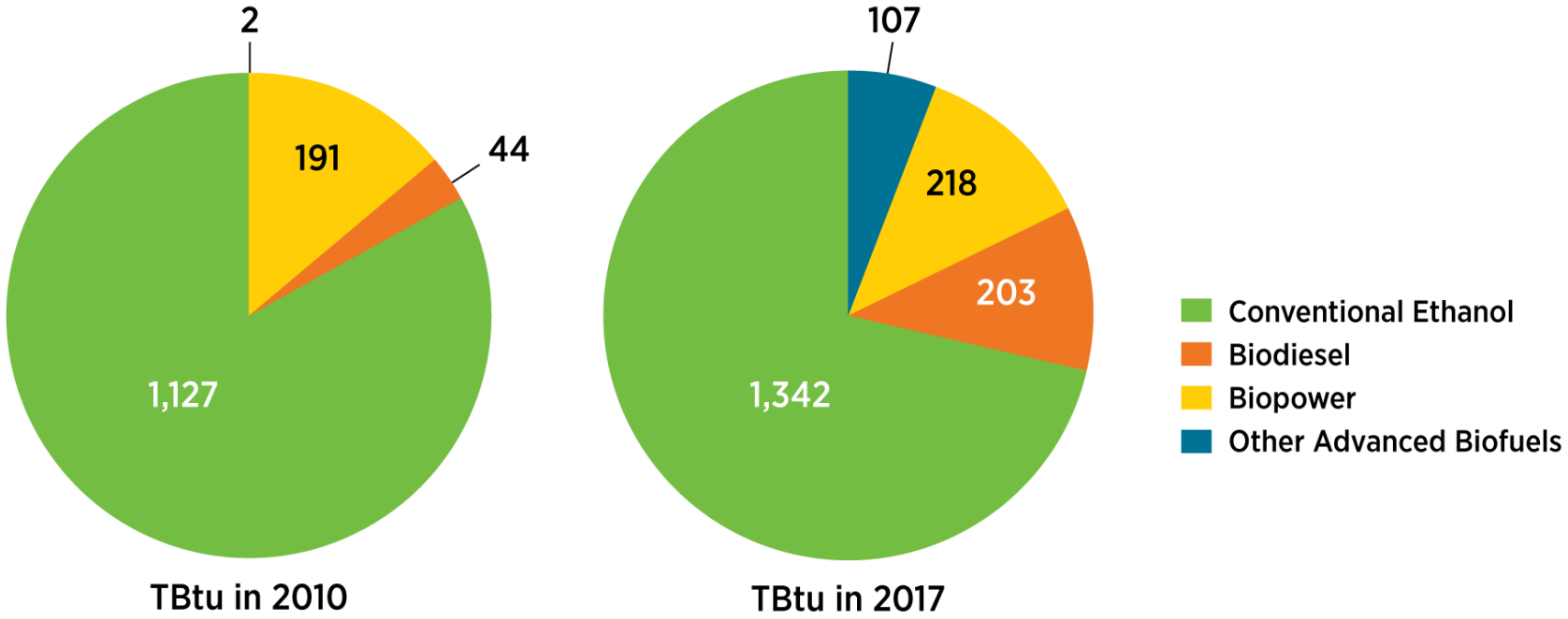
The Bioenergy Industry Status Report Covers Multiple Topics



Ethanol (conventional and cellulosic)	Biodiesel	Renewable Hydrocarbons	Emerging Fuels: Biobutanol, Renewable Natural Gas	Biopower	Bioproducts
Technology	Technology	Technology	General information	Technology	General information for Biochar, Lignin, Platform and intermediate chemicals, Wood pellets (feedstock, production, export data)
Production	Production	Production	Technology	Feedstocks	
Consumption	Feedstocks	Plant status	Production	Production	
Plant status	Consumption	Production costs	Production costs	Capacity and generation	
Production costs	Plant status	Trade		Production costs	
Trade	Production costs	Co-products		Jobs	
Co-products	Trade				
Jobs	Co-products				
Stations	Jobs				
Vehicles	Stations				
End-use	Vehicles				
	End-use				

3-Technical Accomplishments-Task 3 Bioenergy Industry Status Report

The overall bioenergy market continues to grow in all sectors.

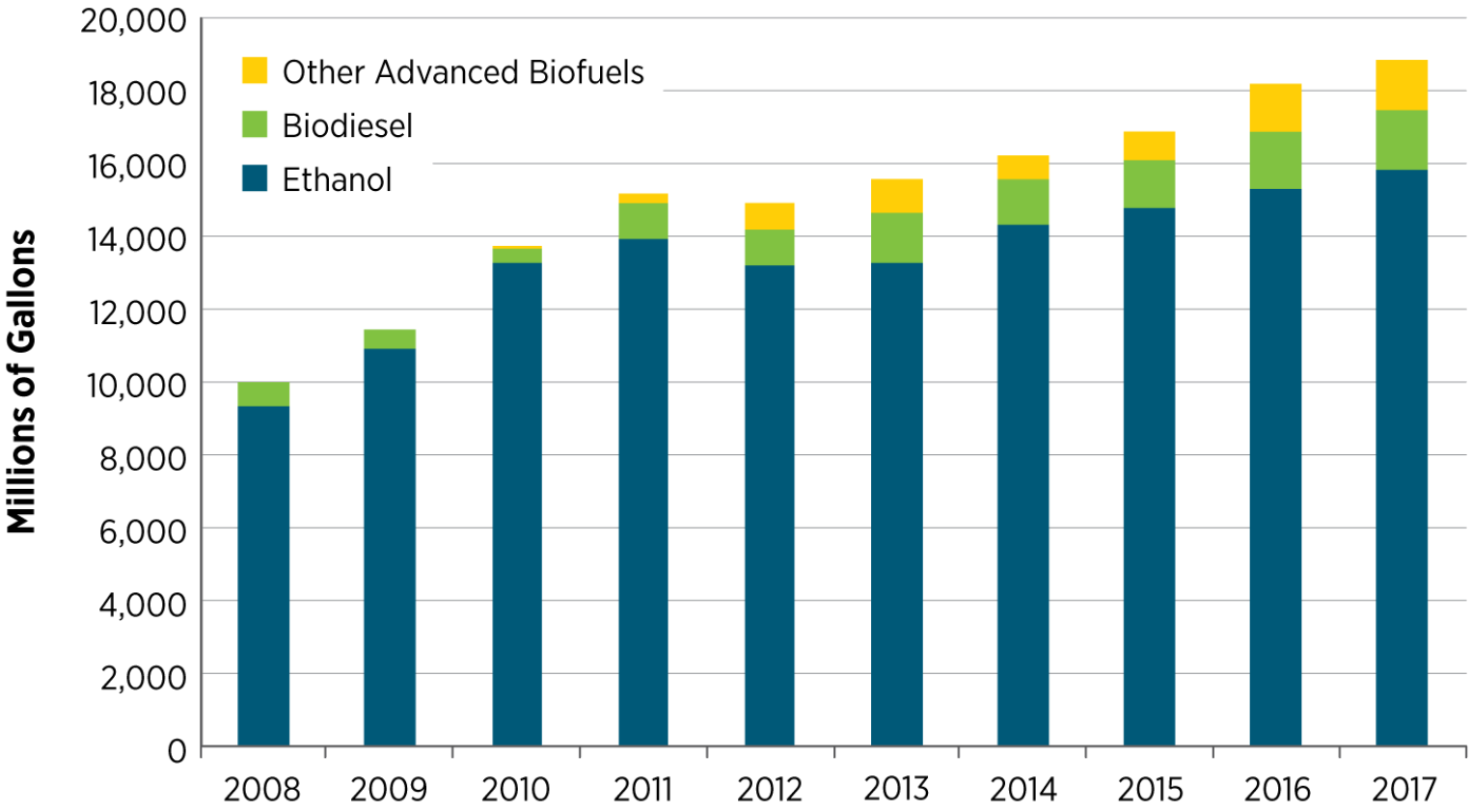


Sources: Conventional Ethanol and Biodiesel: EIA "Annual Energy Review." http://www.eia.gov/totalenergy/data/annual/index.cfm Tables 10.3 and 10.4; Biopower: EIA "Table 1.1.A. Net Generation from Renewable Sources: Total (All Sectors), 2006–December 2016." EIA Electricity Data. https://www.eia.gov/electricity/data.php#generation; Other Advanced Biofuels: EPA. "Public Data for the Renewable Fuel Standard." https://www.epa.gov/fuels-registration-reporting-and-compliance-help/public-data-renewable-fuel-standard.

Notes: This figure only includes the energy content of the product fuels and power, and not the associated coproducts.

3-Technical Accomplishments-Task 3 Bioenergy Industry Status Report-Example

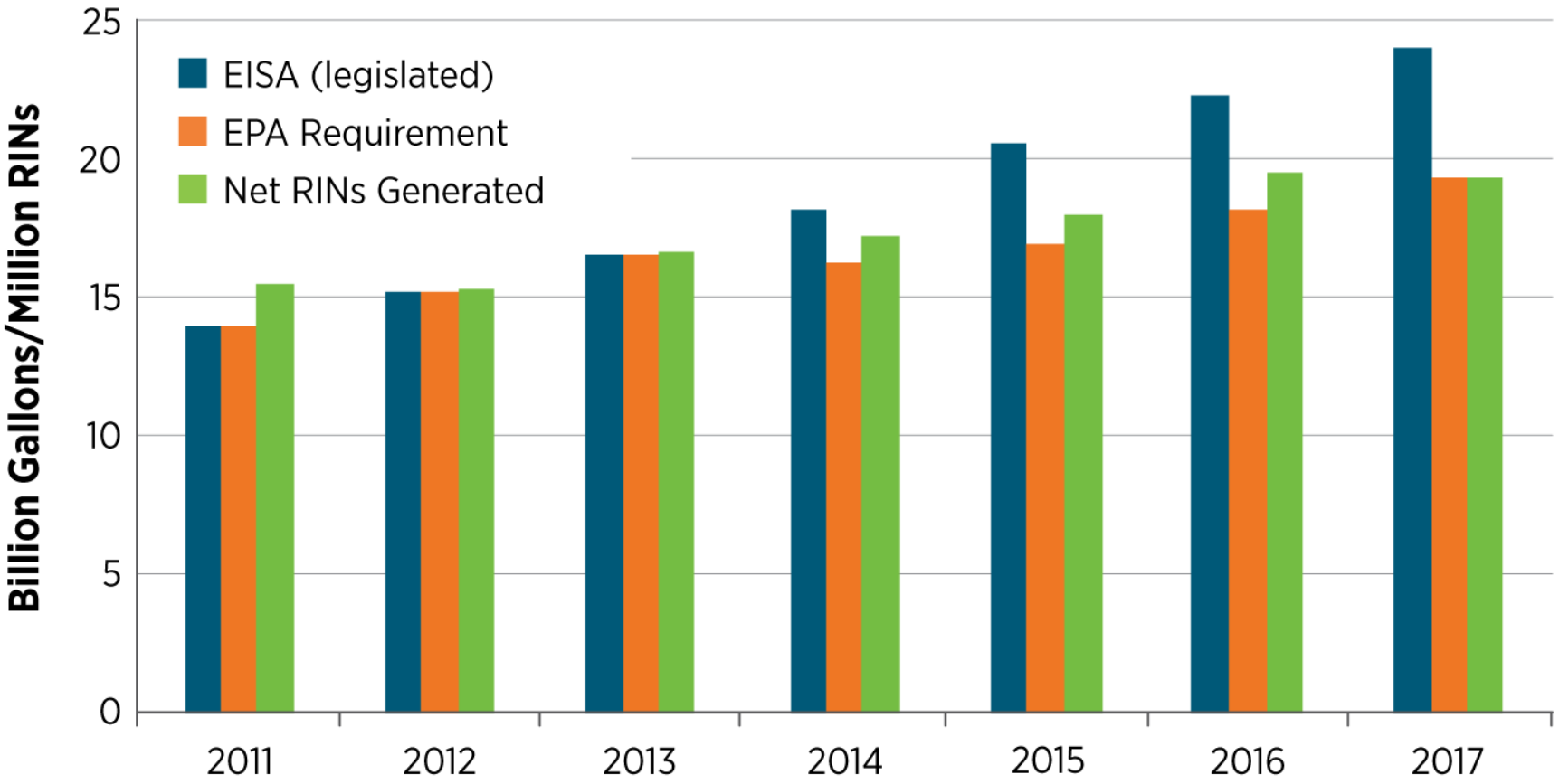
Contribution of fuel types to biofuels market.



Sources: Ethanol and Biodiesel: EIA "Annual Energy Review." Tables 10.3 and 10.4. http://www.eia.gov/totalenergy/data/annual/index.cfm Other Advanced Biofuels: EPA "Public Data for the Renewable Fuel Standard." https://www.epa.gov/fuels-registration-reporting-and-compliance-help/public-data-renewable-fuel-standard.
Notes: Other advanced biofuels include biobutanol, cellulosic fuels, heating oil, jet fuel, naphtha, renewable natural gas, and renewable diesel.

3-Technical Accomplishments-Task 3 Bioenergy Industry Status Report-Example

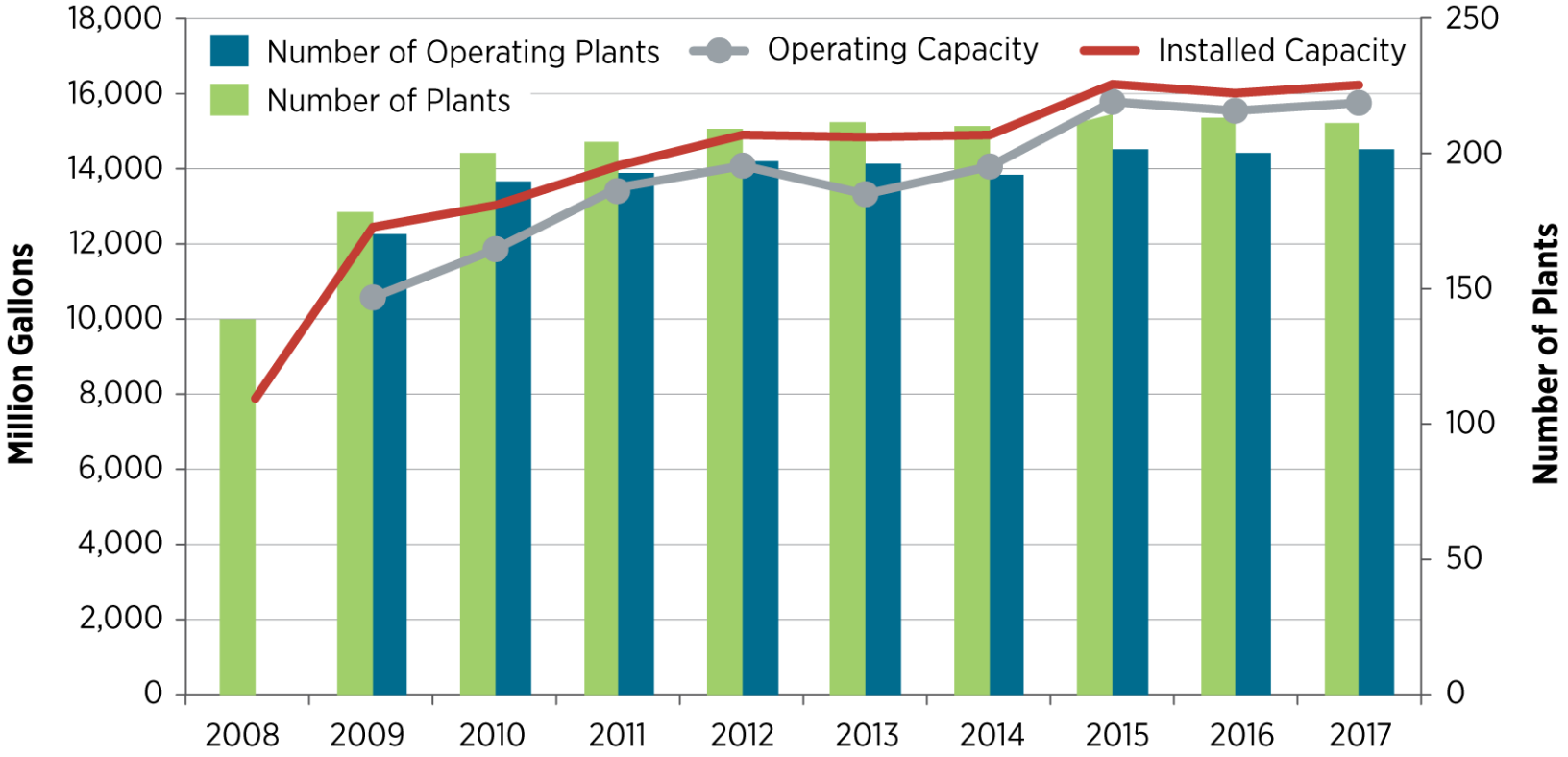
Renewable Fuel Standard progress.



Sources: EISA: U.S. Congress 2007. Energy Independence and Security Act. H.R. 6., 110th Congress. ; EPA Requirement: EPA. "Final Renewable Fuel Standards for 2014, 2015 and 2016, and the Biomass-Based Diesel Volume for 2017." https://www.epa.gov/renewable-fuel-standard-program/final-renewable-fuel-standards-2014-2015-and-2016-and-biomass-based; NET RINs Generated: EPA "Public Data for the Renewable Fuel Standard." https://www.epa.gov/fuels-registration-reporting-and-compliance-help/public-data-renewable-fuel-standard..

3-Technical Accomplishments-Task 3 Bioenergy Industry Status Report-Example

Ethanol plant status-plants tend to operate near capacity.

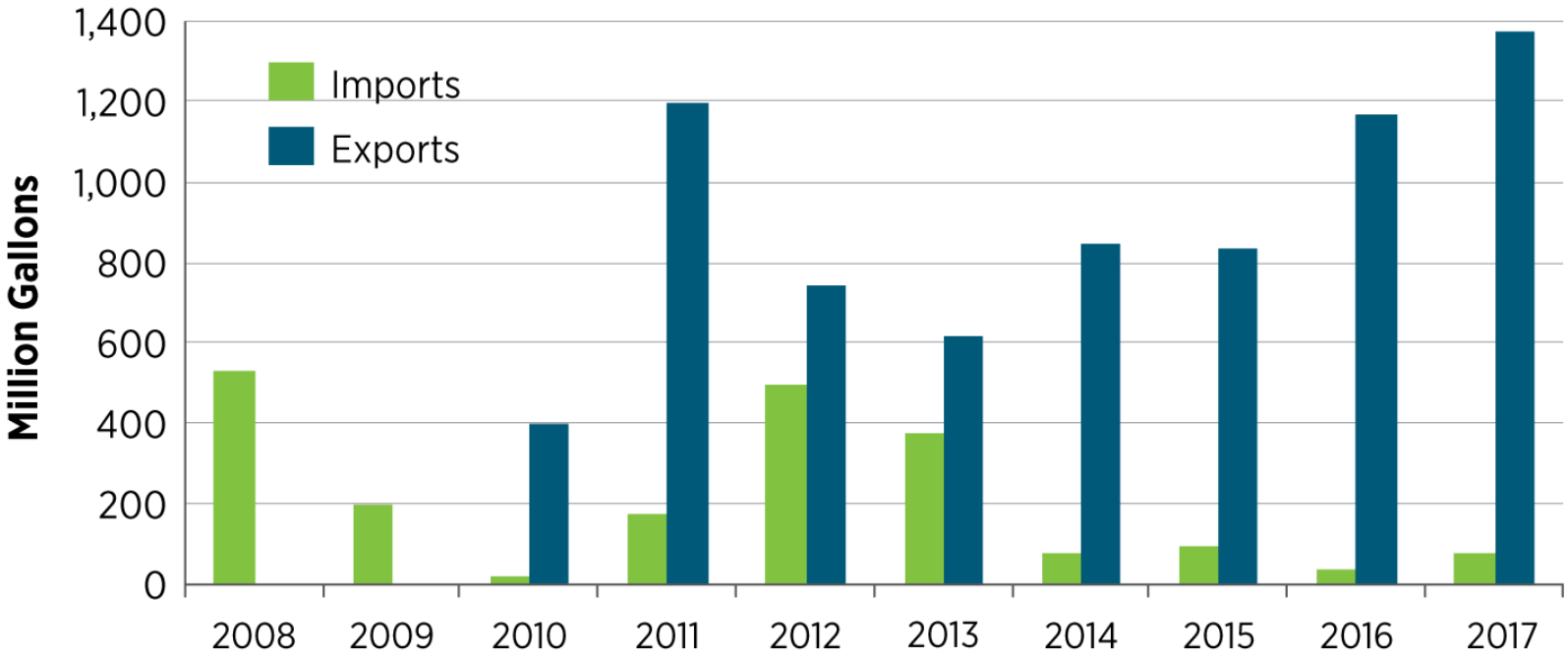


- Ethanol plants generally operate close to capacity.
- Few plants have been built in recent years, near capacity is largely cellulosic

Source: Renewable Fuels Association. 2018. *Pocket Guide to Ethanol 2018*. Washington, DC: RFA. https://ethanolrfa.org/pocket-guide

3-Technical Accomplishments-Task 3 Bioenergy Industry Status Report-Example

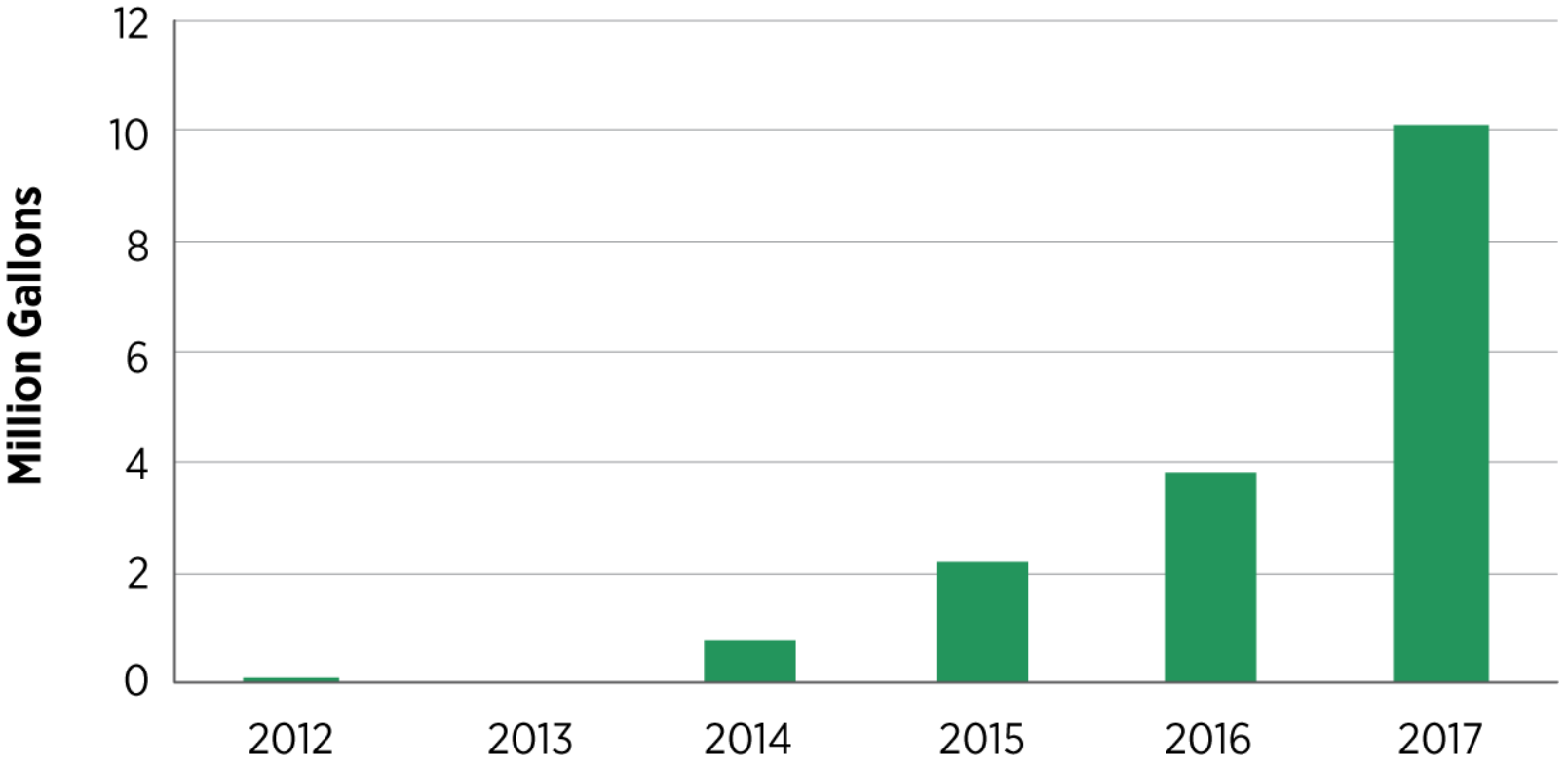
Ethanol trade-overtime went from importing to meeting domestic needs and exporting largely due to changes in policy.



Sources: EIA. "U.S. Imports by Country of Origin." EIA Petroleum & Other Liquids Data. Accessed June 2017. https://www.eia.gov/dnav/pet/pet_move_impcus_a2_nus_epooxe_im0_mbbl_a.htm.
And "Exports by Destination." EIA Petroleum & Other Liquids Data. Accessed June 2017. https://www.eia.gov/dnav/pet/pet_move_expc_a_EP00_EEX_mbbl_m.htm.

3-Technical Accomplishments-Task 3 Bioenergy Industry Status Report-Example

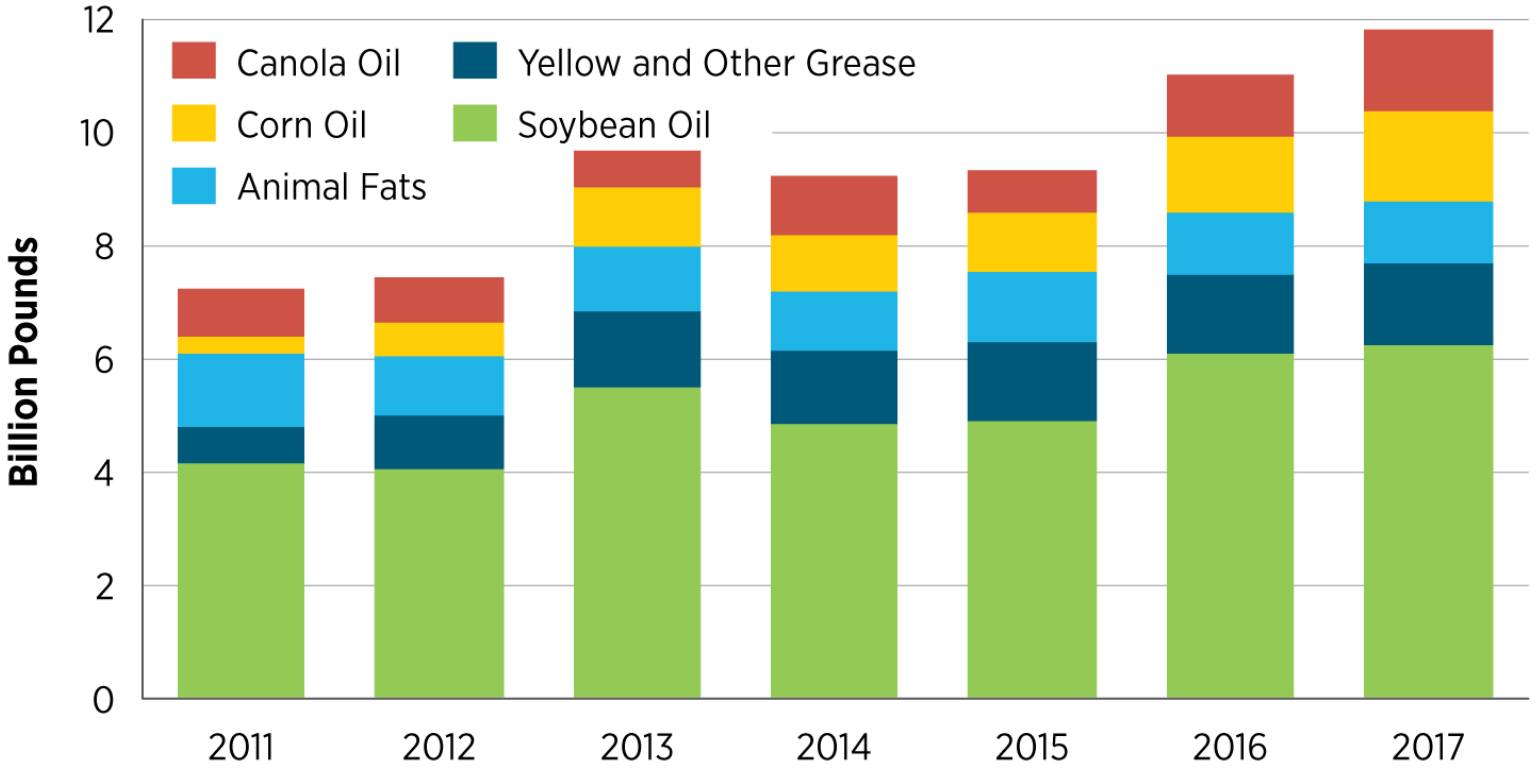
Cellulosic ethanol production has increased with several commercial scale plants coming online in 2017.



Source: EPA. "Public Data for the Renewable Fuel Standard."
https://www.epa.gov/fuels-registration-reporting-and-compliance-help/public-data-renewable-fuel-standard

3-Technical Accomplishments-Task 3 Bioenergy Industry Status Report-Example

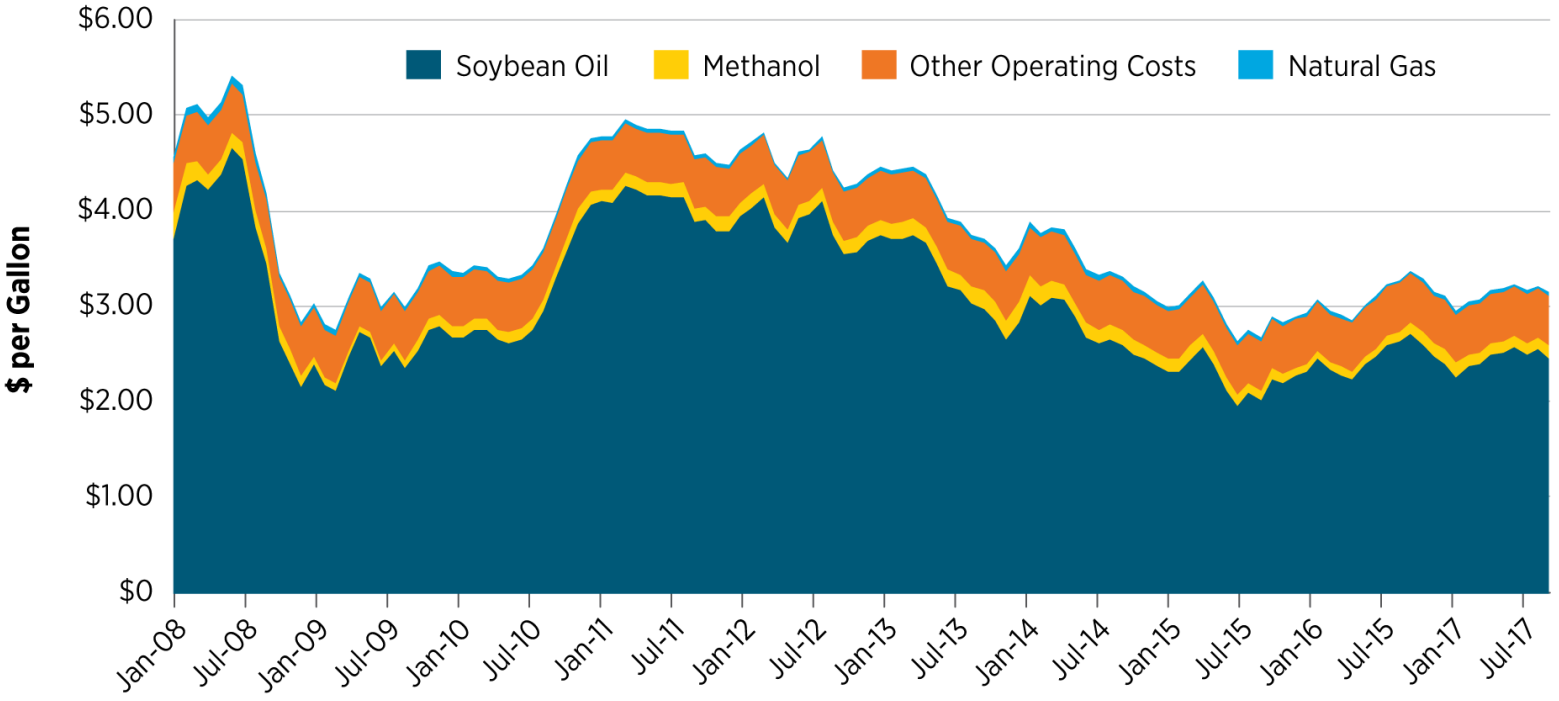
Biodiesel plants have varied their feedstocks overtime. Some plants can use more than one feedstock allowing them flexibility in pricing. Corn oil is sourced from ethanol plants.



Source: EIA. "Monthly Biodiesel Production Report: December 2016." EIA Petroleum & Other Liquids Data. http://www.eia.gov/biofuels/biodiesel/production/ .

3-Technical Accomplishments-Task 3 Bioenergy Industry Status Report-Example

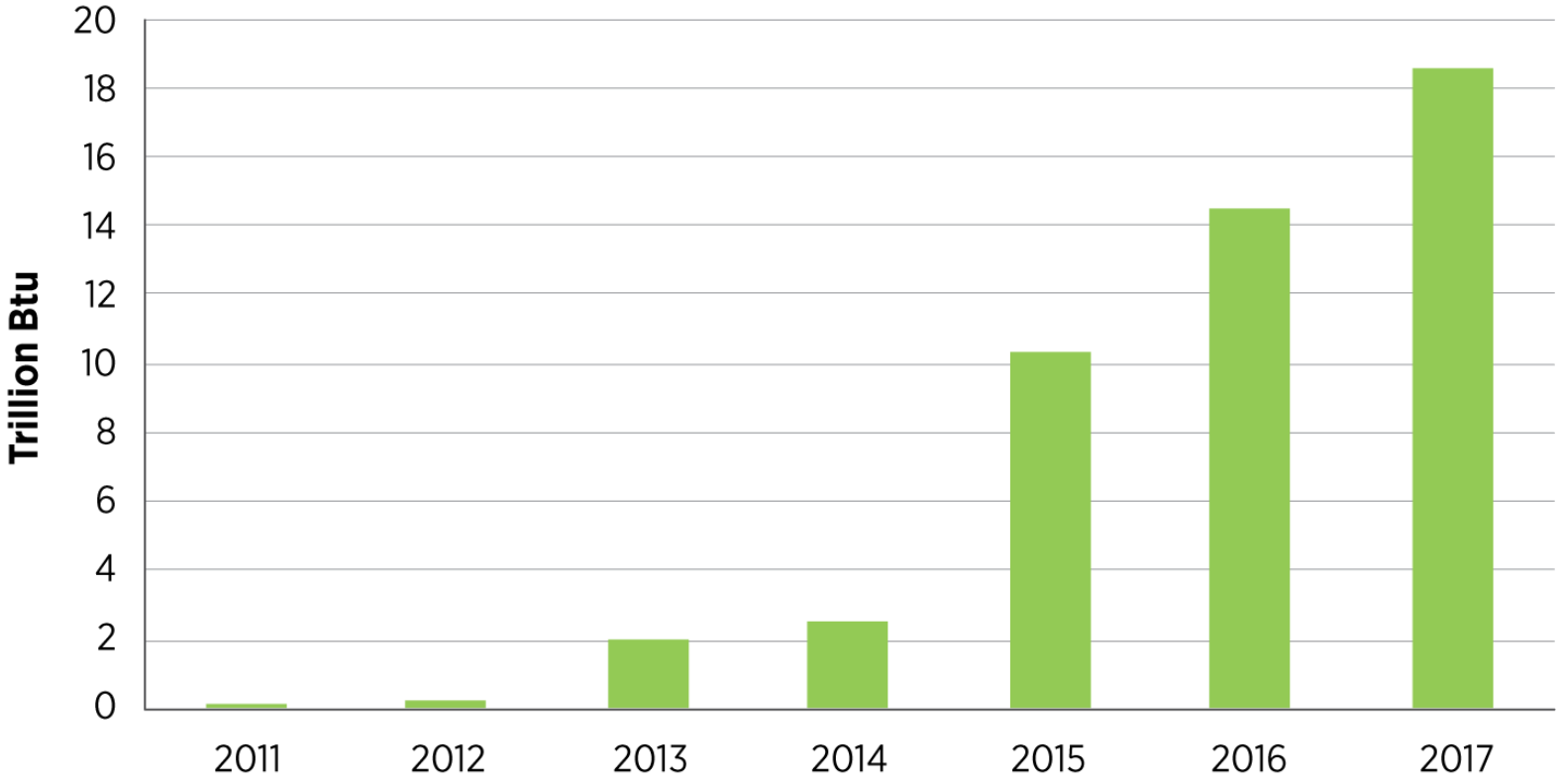
Biodiesel production costs like all biofuels plants are most dependent on feedstock costs.



Source: Hofstrand, D. "Tracking Biodiesel Profitability." Iowa State University Extension and Outreach. http://www.extension.iastate.edu/agdm/energy/html/d1-15.html

3-Technical Accomplishments-Task 3 Bioenergy Industry Status Report-Example

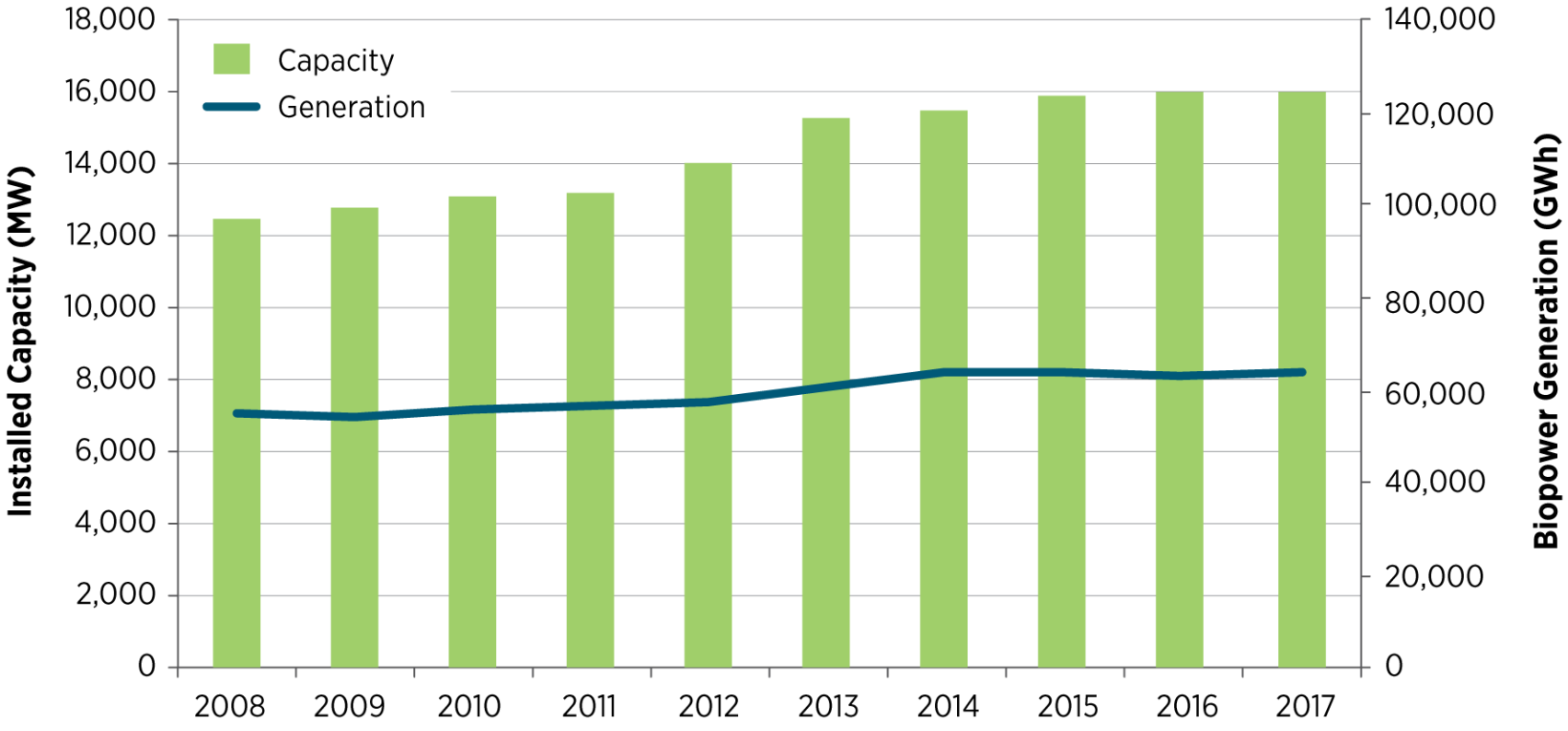
Renewable natural gas production continues to grow. EPA designated renewable natural gas as a cellulosic biofuel under the RFS in 2014. There are 83 facilities (landfills, wastewater treatment plants, and agricultural wastes) in 28 states.



Source: EPA. "Public Data for the Renewable Fuel Standard." https://www.epa.gov/fuels-registration-reporting-and-compliance-help/public-data-renewable-fuel-standard

3-Technical Accomplishments-Task 3 Bioenergy Industry Status Report-Example

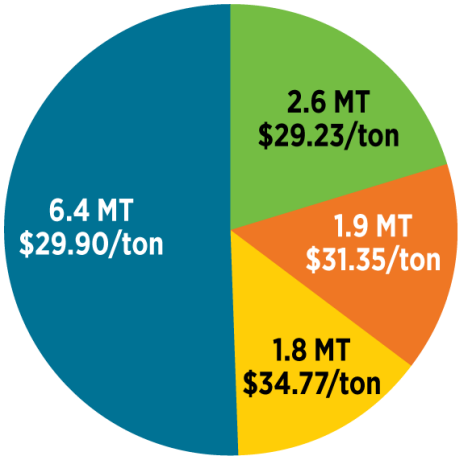
Biopower generation and capacity remain steady.

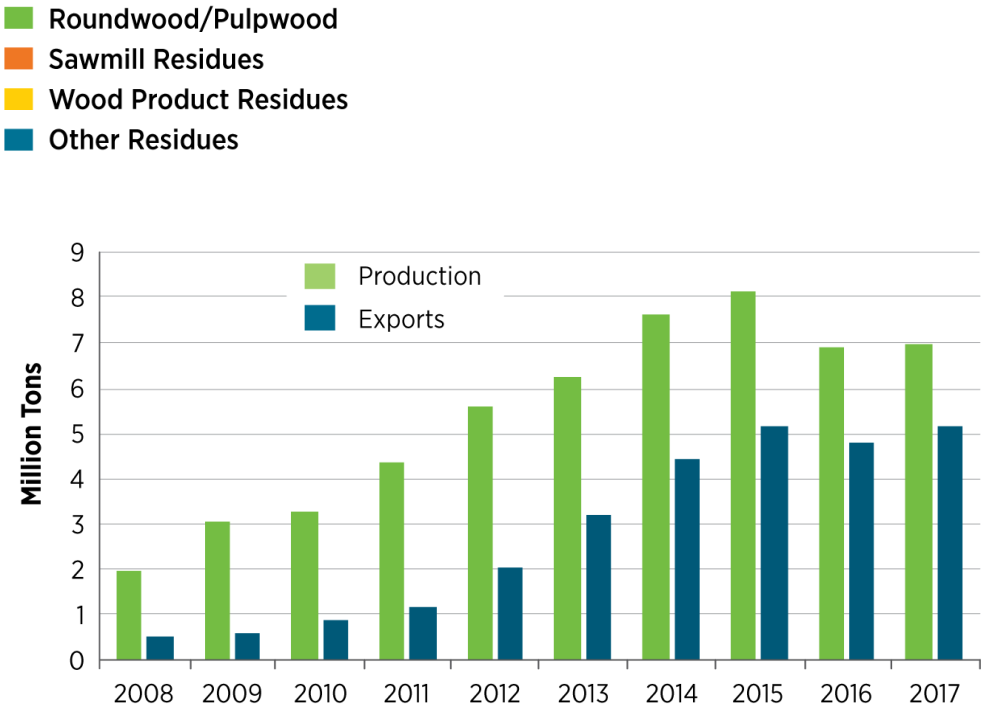


Sources: EIA. "Electric Power Monthly: July 2016." http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_1_1_a and EIA. "Form EIA-860 Detailed Data, 2016." EIA Electricity Data. http://www.eia.doe.gov/cneaf/electricity/page/eia860.html
Notes: Installed capacity includes both biogenic and non-biogenic MSW due to lack of separate data. Biopower generation does not utilize non-biogenic MSW, only biogenic MSW.

3-Technical Accomplishments-Task 3 Bioenergy Industry Status Report-Example

Wood pellet production is largely exported.





Source: EIA. "Monthly Densified Biomass Fuel Report: January 2017."
https://www.eia.gov/biofuels/biomass/#table_data

3-Technical Accomplishments Infrastructure Support

Support industry in biofuel infrastructure compatibility.

- Member of Fuels Institute Board of Advisors which includes a broad range of stakeholders in the transportation industry.
  - Direct research and review reports.
- Voting member of multiple UL refueling equipment standards testing committees.
  - Propose changes to testing protocols, vote on changes to standards.
- Co-Chair of Infrastructure Committee for Ag/Auto/Ethanol which is advancing a high octane ethanol based fuel
  - Assist agriculture organizations, ethanol producers, and vehicle manufacturers in steps needed to introduce a high octane ethanol fuel and engine.
- Member of Society of Automobile Engineers Fuel Grade Assurance Protocol Committee
  - Preparing a technology protocol which seeks to address through technology the risk of misfuelling which has been a barrier for biofuels at stations.
- Member of Coordinating Research Council's ULSD corrosion committee overseeing research into why there is accelerate corrosion at gas stations.
  - Represent biofuels interest in ongoing experiments to determine corrosion causes.
- Respond to all inquiries from private and public entities on biofuel infrastructure.

4-Relevance

- BIC helps BETO meet its goals and objectives of expanding the domestic bioenergy market by providing current relevant bioenergy data and tools to a wide group of stakeholders.
- Stakeholders are using the AFDC and Bioenergy Atlas tools at over 806,000 page views (an instance of an internet user visiting a web page) per year with a budget of FY18 budget of $200,000.
- Data and information collected under these tasks helps inform the Co-Optima project and Biomass Scenario Model.

Google analytics	FY14	FY15	FY16	FY17	FY18
	Pageviews				
AFDC Ethanol Pages	310,210	394,509	405,355	410,166	477,951
AFDC Biodiesel Pages	193,251	210,070	193,951	199,995	209,380
AFDC Emerging Fuel Pages[a]	57,320	68,780	44,818	50,134	43,969
Biofuels Atlas[b]	7,804	58,911	82,594	74,296	64,439
Biopower Atlas[b]	no data	12,227	20,004	14,317	11,072
Total	568,585	744,497	746,722	748,908	806,811

a-renewable natural gas was moved from emerging fuels section to natural gas in FY16
b-NREL reports issues with Google Analytics tracking that began in May 2018, the issue has not been resolved

4-Relevance

- Downloads of the 2015 Bioenergy Market Report and 2016 Bioenergy Industry Status Report from the NREL website total 2,402
- The USDA BIP project provides a unique previously unavailable data set since that offers a better understanding of stations infrastructure, upgrade costs, and sales. This data will be summarized and published.

E85 Data
- Source of E85
- % ethanol in E85

Station Data

Dispensers/pumps:
- # of dispensers by type
- # of refueling positions
- # of dispensers installed under BIP
- Cost of each E10+ dispenser
- Date of install

Tanks:
- # of tanks, type, and volume
- Cost to install each new tank system

Sales Data
- E10, E15, E85, Diesel fuel sales volume by month and year
- E10, E15, E85, Diesel fuel sales price by month and year

Marketing
- Oil or refiner branded station
- Biofuels on price sign data

4-Relevance

Many types of stakeholders use the AFDC and Bioenergy Atlas tools and provide feedback on what is missing. Stakeholders include:

- **Bioenergy companies** and their industry groups, including Advanced Biofuels Association, Electric Power Research Institute, Growth Energy, National Biodiesel Board, and Renewable Fuels Association.
- **Other government agencies,** including DOD, DOI, DOT, EPA, State, and USDA.
- **State offices,** including economic development, energy, environment, and transportation.
- **Retail station owners,** fleet station owners, fuel marketers, refueling equipment manufacturers and their industry groups, including National Association of Convenience Store Owners, National Association of Truck Stop Owners, Petroleum Equipment Institute, Petroleum Marketers Association of America, and Steel Tank Institute.
- **Oil and refining companies** and the American Petroleum Institute.
- **Vehicle and engine manufacturers** and their industry groups, including the Auto Alliance, Society for Automobile Engineers, and United States Council for Automotive Research.
- **Others** include ASTM, Carbon War Room, Environmental and Energy Study Institute, Fuels Institute, institutions, investment firms, and universities.

5-Future Work-Planned Updates

- **Update AFDC biofuels pages annually.**
  - FY19 update underway with subject matter expert review and edits, Clean Cities review, NREL communications, and DOE review.
- **Update Bioenergy Atlas tool data annually.**
  - Review all data for any available updates.
  - Routine platform maintenance.
- **Publish the 2017 Bioenergy Industry Status Report.**
  - Currently under review at BETO.
- **Go/no-go for future funding is based on consistent use of AFDC biofuels pages and Bioenergy Atlas tools which is tracked using Google Analytics.**

5-Future Work-Provide Additional Data to Complement Current State of Knowledge

- **Prepare USDA BIP National Summary Report for publication**
  - FY19 publication will focus on station infrastructure data.
    - Dispenser/pump statistics and costs
    - Tank statistics and costs
    - Station location data
    - Marketing data (oil/refiner branded, prices on signs)
    - Refueling position statistics
  - FY20 publication will include sales price and volume data.
  - Future years will update the report content to reflect more years of fuel sales and prices.

5-Future Work-Continued Industrial Engagement

- **Continue to provide leadership in biofuels infrastructure compatibility.**
  - Provide input on research ideas.
  - Review proposals and draft reports for industry.
  - Seek opportunities to share DOE funded work from all national labs with industry through engagement.
  - Continuing serving industry in multiple capacities:
    - Member of Fuels Institute Board of Advisors which includes a broad range of stakeholders in the transportation industry.
    - Voting member of multiple UL refueling equipment standards testing committees.
    - Co-Chair of Infrastructure Committee for Ag/Auto/Ethanol which is advancing a high octane ethanol based fuel
    - Voting Member of Society of Automobile Engineers Fuel Grade Assurance Protocol Committee
    - Member of Coordinating Research Council's ULSD corrosion committee overseeing research into why there is accelerate corrosion at gas stations.

5-Future Work

- **Publish the 2017 Bioenergy Industry Status Report**
  - Currently under review at BETO
- **Update Bioenergy Atlas tool data annually**
  - Review all data for any available updates
  - Routine platform maintenance
- **Continue to provide leadership in biofuels infrastructure compatibility**
  - Provide input on research ideas
  - Review proposals and draft reports for industry

Summary

OVERVIEW: The Biofuels Information Center (BIC) task provides essential bioenergy data, information, and tools to all stakeholders.

APPROACH: Gather unbiased data, review data for quality, deploy updates to websites and tools, publish reports, leverage funding from other EERE programs, prioritize tasks based on popularity, outreach to industry for feedback on the task as well as making industry aware of updates to data/information/reports.

TECHNICAL ACCOMPLISHMENTS: Publication of the 2015 and 2016 Bioenergy Industry Status Reports; Annual Updates of the AFDC Biofuels pages; analysis and confidential report of the USDA BIP data; data updates to the Bioenergy Atlas tools.

RELEVANCE: 806,811 pageview for AFDC biofuels pages and Bioenergy Atlas tools; 2,400 downloads of Bioenergy Industry Status Reports; significant industry engagement.

FUTURE WORK: Publish USDA BIP summary report and 2017 Bioenergy Industry Status Report, Update AFDC biofuels pages and Bioenergy Atlas tools data.

Response to Reviewers' Comments 2017

- "**..** it would be great if this team could work with the Co-Optima Market Transformation team to evaluate the necessary infrastructure changes that will be required with some of the novel, new blendstocks. **"**
  - **RESPONSE:** PI works on Co-Optima ASSERT team and uses data from the BIC task to inform Co-Optima.
- "It would be valuable to present more information on how this website fills a gap relative to what is being provided by private industry and others and on the usage compared to other pages at DOE and other organizations."
  - **RESPONSE:** The AFDC covers multiple biofuels (ethanol, biodiesel, renewable hydrocarbons, renewable natural gas, biobutanol, methanol, etc). Private industry tends to cover a single biofuel. The AFDC is regularly reviewed and updated for content to ensure we are providing the best available quality data and information. The two most popular websites for DOE EERE are the AFDC and Fueleconomy.gov

Response to Reviewers' Comments 2017

- General comments on how the BIC task and ORNL's Knowledge Discovery Framework (KDF) interact and are similar/different.
  - **RESPONSE:** The BIC and Bioenergy KDF tasks both complement and differ from one another. The emphasis of the BIC task is on existing feedstocks and infra- structure data while the focus of the Bioenergy KDF is on forward projections of feedstocks. NREL, with stakeholder input, selects, updates, and maintains data and information available in AFDC, Biofuels Atlas, and Biopower Atlas. The Bioenergy KDF allows users to upload and share bioenergy publications and data with a mapping application focused on showcasing data from the Billion Ton Study report series. Automated methods allow sharing of data between tools.

Publications

- 2016 Bioenergy Industry Status Report
  - https://www.nrel.gov/docs/fy18osti/70397.pdf
- 2015 Bioenergy Market Report
  - https://www.nrel.gov/docs/fy17osti/66995.pdf
- Alternative Fuels Data Center
  - https://afdc.energy.gov
- Bioenergy Atlas Tools
  - https://www.nrel.gov/gis/tools.html