

Biofuels Information Center BETO 2021 Peer Review A&S

March 12, 2021
Analysis & Sustainability
Kristi Moriarty
NREL
6.3.0.1 Biofuels Information Center

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.

GOALS

- The Biofuels Information Center (BIC) task provides essential bioenergy data, information, and tools to educate stakeholders on all aspects on biofuels .
 - This is accomplished through the Alternative Fuels Data Center; the Bioenergy Atlas tools; analysis of USDA Biofuels Infrastructure Partnership data; and publication of the Bioenergy Industry Status report.

1. Management

- **PRIORITIZE** tasks based on data availability and usage of deliverable (data, tools, webpages, reports).
- **ENGAGE** industry and other stakeholders for input on what information, data, and tools are relevant and necessary to grow the bioenergy market.
- **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.
- **RISK** of data delays is mediated by working with USDA and other data suppliers to identify when data is expected if late and scheduling deliverable dates to accommodate late data from agencies and other organizations.

1. Management

TASK & 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 updates to existing data and provide them to NREL's GIS team.
- **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 public report.
- **Bioenergy Industry Status Report** Kristi Moriarty and Anelia Milbrandt lead updating the data and content. Other NREL subject matter experts participate as needed. This report is updated periodically.
- **Infrastructure Support** Kristi Moriarty works with industry by co-leading a committee, voting member of multiple committees, and board member of an industry organization.

1. Management-Data & Information Sources

The majority of data and information are sourced from federal agencies supplemented with vetted industry data when federal data is unavailable.



2. Approach

- **GATHER** unbiased, relevant industry data primarily from EIA, EPA, USDA, EERE projects, and industry.
- **PROTECT** USDA BIP sensitive business data using federally approved secure data transfer 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.
- **TEST** online tools for data accuracy and functionality.
- **DEPLOY** data and information updates to websites and tools.
- **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 the AFDC platform and 16 other NREL funders of the OpenCarto platform where Biofuels Atlas and Biopower Atlas reside.

2. Approach

CHALLENGES

- Ensuring USDA BIP timeliness of data and quality.
 - Achieved by reviewing data quality to identify obvious and easy to fix errors.
 - Communicating to USDA and industry partners where data quality or omissions are impacting the overall dataset and asking for re-submittals.
- Data timeliness and relevance for AFDC, Bioenergy Atlas, and Bioenergy Report.
 - All tasks rely on updates rely on multiple sources and requires reaching out to data sources when updates are not delivered as expected.
 - Identifying new data sets and determining their relevance by engaging stakeholders for input to determine usefulness of adding them to websites, tools, and reports.

GO/NO-GO

- Based on use of AFDC as monitored by Google Analytics. If there is a decline in use, funding will be reevaluated.

2. Approach

Table 1: General BIP Station Information (Part 1)	
Grant Agreement No.	123456
Date	27-Sep
State Name	Florida
Station Name	ABC Store
Station Address (line 1)	
Station Address (line 2)	Tampa, FL 33605
Station type (branded, unbranded)	Unbranded
Specify E85 Wholesale Supplier Type (terminal or ethanol plant)	Terminal
Specify Name and Location of E85 Wholesale Supplier	Magellan, Various
Average ethanol content in E85 (%)	70
Is E15 listed on price sign? (Yes listed as E15, Yes listed as +octane, No)	Yes, listed as E15
Is E85 listed on price sign? (Yes, No)	Yes

Missing address

Table 2: Inventory of Refueling Positions	Before BIP	After BIP
Number of E15/25 refueling positions		6
Number of E85 refueling positions	15	10
Number of Diesel refueling positions	4	4
Total number of all refueling positions	19	20

Wrong data entry

Table 3: Inventory of Tanks	Before BIP	After BIP
Number of UST Steel Tanks		
Number of UST Fiberglass	5	5
Number of UST Other		
Number of AST Steel		
Number of AST Other		
Total Number of Tanks at Station	5	5

Why is this pump more \$?

Table 4: Pumps Funded by BIP	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5
Date of Installation	6/17/18	6/17/18	6/17/18		
Type of dispenser (Dedicated E15/25, Dedicated E85, Blender Pumps with E85, Other Blender Pumps)	Blender Pumps w/	Blender Pumps w/	Blender Pumps w/	E85	
Under Canopy? (Yes, No)	Yes	Yes	Yes		
Was piping included in pump cost-share amount? (Yes, No)	Yes	Yes	Yes		
Federal Cost Share Amount	\$14,131.00	\$14,131.00	\$14,131.00		
Non-Federal Cost Share Amount	\$14,723.00	\$14,723.00	\$37,421.00		
Total Pump Installation Cost	\$ 28,854.00	\$ 28,854.00	\$ 51,552.00	\$ -	\$ -

USDA BIP Data Example

- Review ~1,700 spreadsheets submitted by ~850 stations.
- Example of Part 1 data.
- Excel allows for open entry and therefore opportunities for mistakes.
- Identify missing or suspected incorrect data and report back to USDA.
- Vastly out of range data not included in analysis

2. Approach

Table 6: General BIP Station Information (Part 2)						
Grant Agreement No.	123456					
Worksheet Completion Date	3/20/20					
State Name	Florida					
Station Name	ABC Store					
Station Address (line 1)						
Station Address (line 2)	Tampa, FL 33605					
Location (GPS)						
Date of Installation	7/21/18					

Table 8: 2017 Sales						
Type of Fuel	January		February		March	
	Avg Retail Sales Price	Gallons Sold	Avg Retail Sales Price	Gallons Sold	Avg Retail Sales Price	Gallons Sold
E10	\$1.890	97,367.9	\$1.720	81,857.4	\$2.040	113,624.8
E15					\$1.950	3,634.6
E85		3,543.3		2,368.4		4,368.5
Diesel	\$1.850	69,156.1	\$1.790	70,948.8	\$2.000	76,211.4

Table 9: 2018 Sales						
Type of Fuel	January		February		March	
	Avg Retail Sales Price	Gallons Sold	Avg Retail Sales Price	Gallons Sold	Avg Retail Sales Price	Gallons Sold
E10	\$2.319	105,382.2	\$2.241	99,572.7	\$219.200	32,000.0
E15	\$2.221	6,782.4	\$2.146	6,931.9	\$2.099	9,503.6
E85	\$1.763	3,858.2	\$1.796	3,795.8	\$1.875	4,364.5
Diesel	\$2.441	66,132.4	\$2.399	68,524.0	\$2.392	86,576.6

Table 10: 2019 Sales						
Type of Fuel	January		February		March	
	Avg Retail Sales Price	Gallons Sold	Avg Retail Sales Price	Gallons Sold	Avg Retail Sales Price	Gallons Sold
E10						
E15	\$2.368	3,572.9	\$2.544	3,155.0	\$2.445	4,697.8
E85	\$1.891	2,747.6	\$1.895	2,819.5	\$1.896	3,452.3
Diesel	\$2.860	89,677.7	\$2.906	76,849.0	\$2.832	106,979.9

USDA BIP Data Example

- Review ~1,700 spreadsheets submitted by ~850 stations
- Example of Part 2 data
- Review data 2015-2019
- Identify missing or suspected incorrect data
- Sometimes entire states missing one year of data
- Contact USDA to ask stations for missing data
- Vastly out of range data not included in analysis

3. Impact

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

- **Bioenergy companies** and their industry groups.
- **Other government agencies**, including DOD, DOI, DOT, EPA, State, and USDA.
- **State offices** including agriculture, economic development, energy, environment, and transportation. State corn and soybean boards.
- **Refueling equipment manufacturers** and their industry groups.
- **Retail station owners** and their industry groups.
- **Oil and refining companies** and the American Petroleum Institute.
- **Vehicle and engine manufacturers** and their industry groups.
- **Others** include ASTM, Coordinating Research Council, Fuels Institute, institutions, investment firms, and universities.

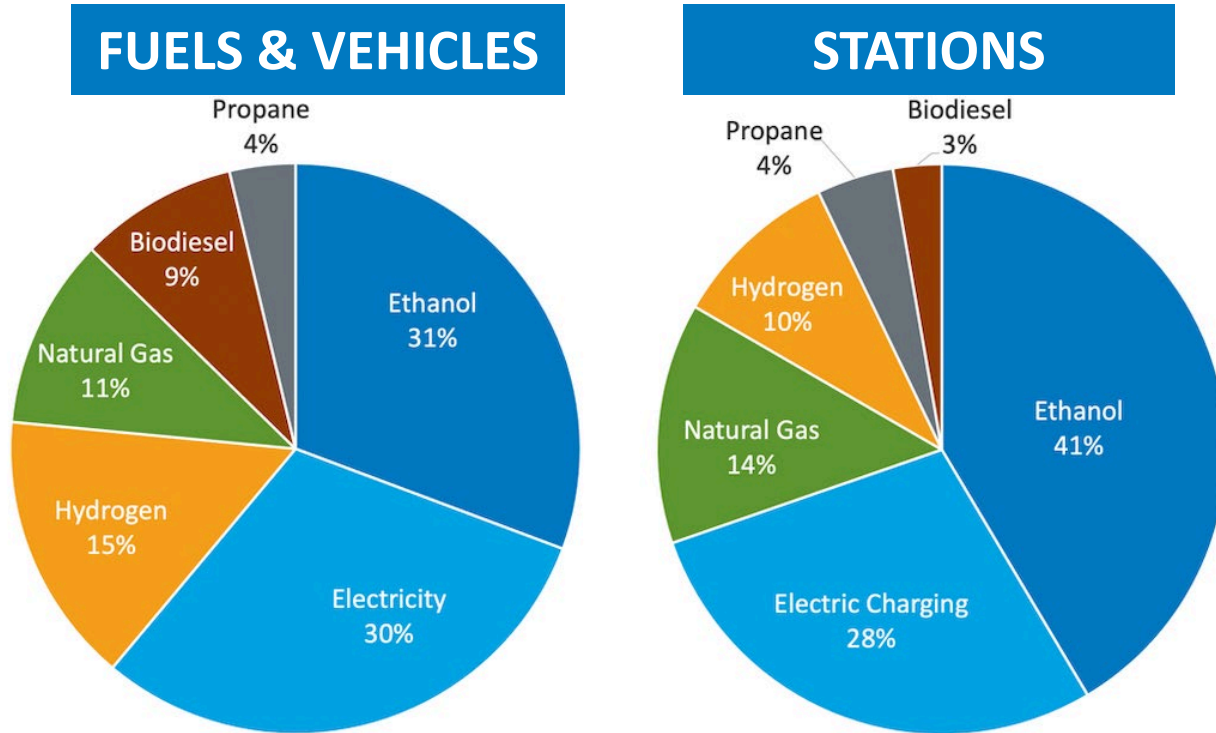
3. Impact

- BIC helps BETO meet its goals and objectives of expanding the domestic bioenergy market by providing current and relevant bioenergy data and tools to a wide group of stakeholders.
- In FY20, AFDC usage exceeded 1 million pageviews (an instance of an internet user visiting a web page) with a budget of \$220,000.

Google analytics	FY16	FY17	FY18	FY19	FY20
			<i>Pageviews</i>		
AFDC Ethanol Pages	405,355	410,166	477,951	601,338	753,390
AFDC Biodiesel Pages	193,951	199,995	209,380	171,495	219,865
AFDC Emerging Fuel Pages	44,818	50,134	43,969	43,425	50,960
Total	644,124	660,295	731,300	816,258	1,024,215

3. Impact

In FY20, pageviews of AFDC biofuels content exceeded EV content.



FY20 AFDC Google Analytic use data. Fuels & vehicles: 2.4 million pageviews; Stations: 4.4 million pageviews.

3. Impact

The USDA Biofuels Infrastructure Partnership (BIP) task provides a valuable and previously unavailable data set (gas stations are privately owned). Data collected from ~850 stations includes:

- E10, E15, and E85 monthly sales price and volume data.
 - Allows for comparison between higher blends and conventional fuel.
- Costs of dispensers (pumps) and underground storage tank systems.
 - Provides insight into infrastructure upgrade costs to accommodate a new non-fungible fuel.
- Market data include % of ethanol in E85 (varies 51%-83%), source of E85, number of refueling positions (spots where a car can pull up and buy a particular fuel), number and types of tanks, if E15 and E85 are on the price sign, if station is branded by oil company.

4. Progress and Outcomes-AFDC

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>

The screenshot shows the homepage of the Alternative Fuels Data Center (AFDC) website. At the top, it features the U.S. Department of Energy logo and navigation links for 'Energy Efficiency & Renewable Energy', 'EERE Home | Programs & Offices | Consumer Information', and a search bar for the AFDC. The main navigation menu includes 'FUELS & VEHICLES', 'CONSERVE FUEL', 'LOCATE STATIONS', 'LAWS & INCENTIVES', 'Maps & Data', 'Case Studies', 'Publications', 'Tools', 'About', and 'Home'. Below the navigation, there are sections for 'Fuels & Vehicles' with icons for Biodiesel, Electricity, Ethanol, Hydrogen, Natural Gas, and Propane; 'Information by State' with a map and a state selection dropdown; 'Information by Fleet Application' with icons for Delivery Services, Refuse Collection, Public Transit, and School Transportation; 'Maps & Data' with a list of links and a 'Fuel Prices' chart; and 'Tools' with links for Laws & Incentives, Electricity Sources & Emissions, Vehicle Cost Calculator, and Vehicle Search. A 'Station Locator' map is also visible. At the bottom, there is a banner for 'Clean Cities 25th Anniversary' and a footer with app download links for iPhone and Android.

U.S. DEPARTMENT OF ENERGY Energy Efficiency & Renewable Energy

EERE Home | Programs & Offices | Consumer Information

Alternative Fuels Data Center

Search the AFDC

FUELS & VEHICLES CONSERVE FUEL LOCATE STATIONS LAWS & INCENTIVES Maps & Data Case Studies Publications Tools About Home

EERE » AFDC

Fuels & Vehicles »

Biodiesel Electricity Ethanol Hydrogen Natural Gas Propane

Information by State »

Information by Fleet Application »

Delivery Services Refuse Collection
Public Transit School Transportation

Maps & Data »

- U.S. Alternative Fueling Stations by Fuel Type
- U.S. Hybrid Electric Vehicle Sales by Model

Fuel Prices

Tools »

- Laws & Incentives
- Electricity Sources & Emissions
- Vehicle Cost Calculator
- Vehicle Search

Station Locator

Download iPhone app or Android app

Clean Cities U.S. Department of Energy

25th ANNIVERSARY 1992-2017

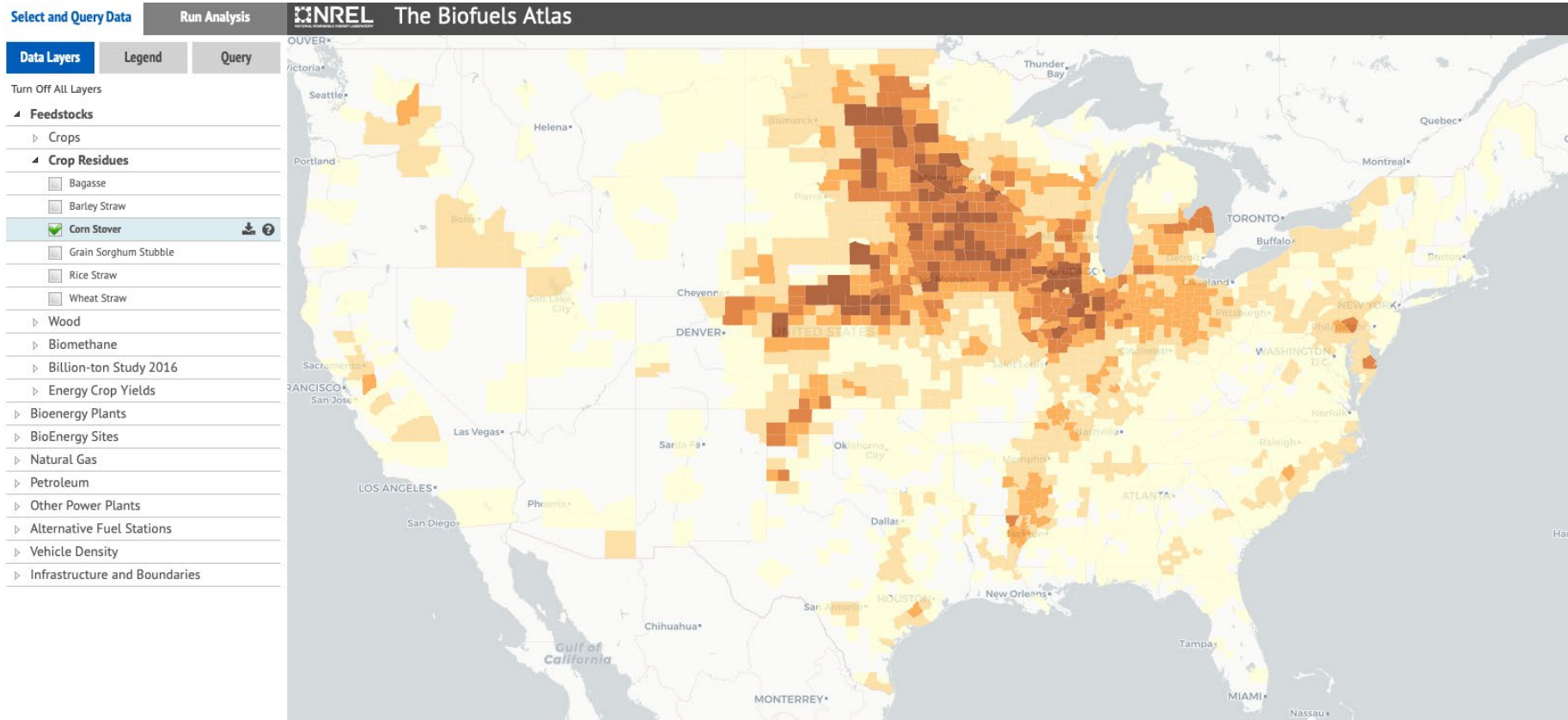
Decades of Experience Driving Transportation Forward
Discover how Clean Cities coalitions have made significant advancements through the years.

The Information Source for Alternative Fuels and Advanced Vehicles

The Alternative Fuels Data Center (AFDC) provides information, data, and tools to help fleets and other transportation decision makers find ways to reach their energy and economic goals through the use of alternative and renewable fuels, advanced vehicles, and other fuel-saving measures.

4. Progress and Outcomes-Bioenergy Atlas Tools

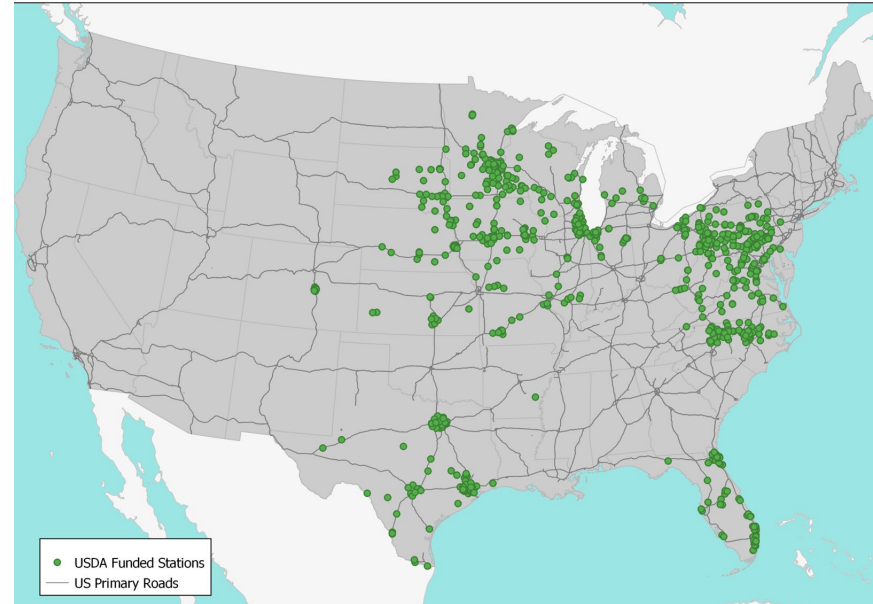
Bioenergy Atlas data layers are updated annually. Functionality is added over time, and upgrades are made to the technical platform.



4. Progress and Outcomes-USDA BIP

Review & Analyze BIP data and prepare a national summary report.

- USDA and state/industry partners invested approximately \$186 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 from ~850 stations, loads it to a database, and prepares graphics and a report from the data.
- NREL prepared has prepared a detailed and summary reports in FY18, FY19, and FY20, latter version is under review for publication with DOE.
- This is a five year project.



4. Progress and Outcomes-USDA BIP

The BIP provides insights on costs to upgrade or replace infrastructure to accommodate biofuels.



Dispensers
Installed
4,430

Avg Total
Dispenser
Cost
\$35,478

Tanks
Installed
155

Avg Total
Cost
\$119,947

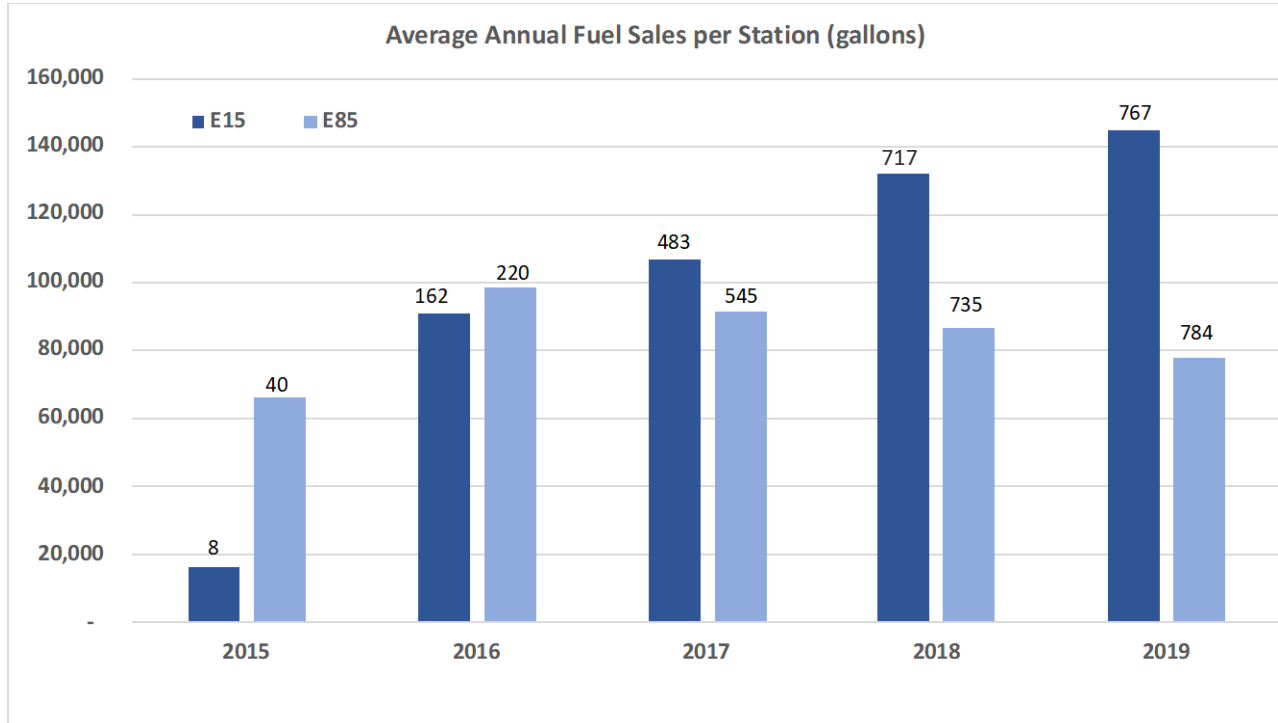
4. Progress and Outcomes-USDA BIP

BIP sales data allows for comparison of sales prices and sales volume for E10, E15, and E85.

Fuel	2015	2016	2017	2018	2019
			per gallon		
E10	\$2.41	\$2.13	\$2.37	\$2.63	\$2.50
E15	\$2.03	\$2.01	\$2.29	\$2.56	\$2.44
E85	\$1.98	\$1.69	\$1.93	\$2.17	\$2.16

4. Progress and Outcomes-USDA BIP

Average and total E15 sales grew each year while E85 did not. This result is not surprising since E15 can be used in any spark-ignited model year 2001 or newer vehicle while E85 can only be used flexible fuel vehicles.



4. Progress and Outcomes-Bioenergy Industry Status Report

Prepare and publish 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.



2017 Bioenergy Industry Status Report

Kristi Moriarty, Anelia Milbrandt, John Lewis,
and Amy Schwab

National Renewable Energy Laboratory

<https://www.nrel.gov/docs/fy20osti/75776.pdf>

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Technical Report
NREL/TP-5400-75776
February 2020

4. Progress and Outcomes-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
Production
Consumption
Plant status
Production costs
Trade
Co-products
Jobs
Stations
Vehicles
End-use

Technology
Production
Feedstocks
Consumption
Plant status
Production costs
Trade
Co-products
Jobs
Stations
Vehicles
End-use

Technology
Production
Plant status
Production costs
Trade
Co-products

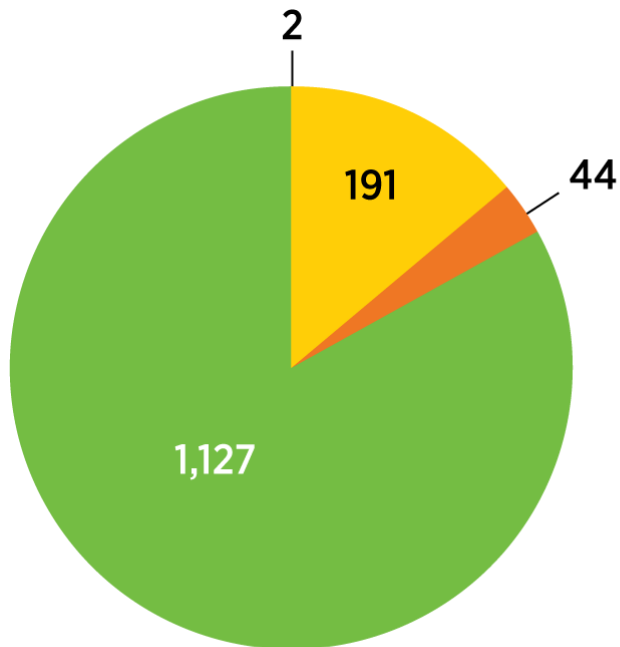
General
information
Technology
Production
Production costs

Technology
Feedstocks
Production
Capacity and
generation
Production costs
Jobs

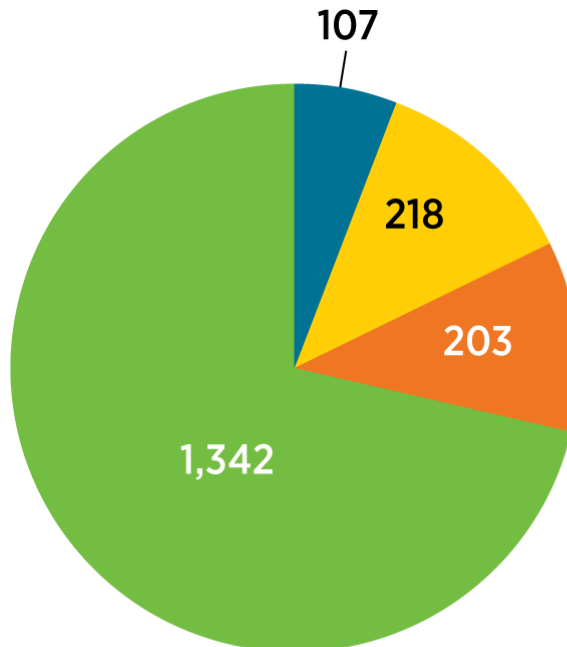
General
information for
Biochar,
Lignin,
Platform and
intermediate
chemicals,
Wood pellets
(feedstock,
production,
export data)

4. Progress and Outcomes-Bioenergy Industry Status Report

Each year the bioenergy market expands. Measured in trillion British thermal units (TBtu).



TBtu in 2010



TBtu in 2017

- Conventional Ethanol
- Biodiesel
- Biopower
- Other Advanced Biofuels

Quad Chart Overview

Timeline

- Began in FY2008
- Ongoing

	FY20	Active Project
DOE Funding	(10/01/2019 – 9/30/2020) \$220,000	\$660,000 (FY19-FY21)

Project Partners*

- USDA (does not provide funding)

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

Project Goal

The goal of this project is to provide relevant data, information, and tools via the AFDC, Bioenergy Atlas websites, and Bioenergy Industry Status Report to enable stakeholders to make bioenergy decisions. Publish biofuel infrastructure data and costs as well as biofuel sales data for comparison to conventional fuel sales.

End of Project Milestone

- Publish USDA BIP reports
- Provide current and relevant information and data on the AFDC and Bioenergy Atlas Tools
- Provide infrastructure support to industry

Funding Mechanism

Annual Operating Plan (AOP).

Summary

- **MANAGEMENT:** Identify quality data sources, ask industry for input, communicate timelines/approach to BETO, outreach project output to industry
- **APPROACH:** Gather unbiased data, review data and content for quality, prepare and publish reports, determine funding based on content usage statistics
- **IMPACT:**
 - Over 1 million pageviews for AFDC in FY20
 - Providing previously unavailable gas station infrastructure data and E10, E15, and E85 sales volume and price data
- **OUTCOME:**
 - USDA BIP National Summary of station data awaiting publication approval
 - AFDC biofuels pages information and data updated annually
 - Bioenergy Atlas tools annual data updates and platform maintenance
 - Publication of the Bioenergy Industry Status Report
 - Industry support for biofuels infrastructure

Thank you

www.nrel.gov

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Additional Slides

Future Work

- **Publish 2019 USDA BIP data summary report**
 - Update BIP data and publish reports for 2020 and 2021 data.
- **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.
- **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.**

- 2017 Bioenergy Industry Status Report
 - <https://www.nrel.gov/docs/fy20osti/75776.pdf>
- 2016 Bioenergy Industry Status Report
 - <https://www.nrel.gov/docs/fy18osti/70397.pdf>
- Alternative Fuels Data Center
 - <https://afdc.energy.gov>
- Bioenergy Atlas Tools
 - <https://www.nrel.gov/gis/tools.html>