



**DYNAMIC SUSTAINABILITY  
LAB™**

**An External Evaluation of the:**

**The Biorefinery, Renewable Chemical, and Biobased  
Product Manufacturing Assistance (9003) Program**



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November 2022

Technical Report #2022-11-1

## ACKNOWLEDGEMENTS

This report was funded in part by a Cooperative Agreement from the Rural Business-Cooperative Service unit within the Office of Rural Development at the USDA.

The authors wish to thank the leadership at USDA Office of Rural Development for their support and cooperation including:

- Mark Brodziski, Deputy Administrator
- Andrew Jermolowicz, Assistant Deputy Administrator
- James Campbell III, Energy Program Specialist
- Chris Cassidy, Renewable Energy Advisor

Additionally, we are thankful to the numerous individuals and organizations who communicated with the authors of this report and have provided important insights and information. These individuals have been actively engaged in Biorefinery, Renewable Chemical, and Biobased Product Manufacturing Assistance (9003) Program. This includes individuals and organizations spanning finance, agriculture, legal, manufacturing, chemical and fuels, industry organizations and former government officials.

All data presented is derived from records provided by the 9003 office at USDA.

Where gaps in data existed or where inconsistencies existed, the researchers sought to obtain supplemental information and clarifying information through research and/or discussions with individuals inside and outside of the USDA organization.

## EXECUTIVE SUMMARY

The 9003 has its origins back to 2002 when the Congress of the United States envisioned a pathway to further support American farmers and American manufacturers opportunities through the development of Biobased fuels.

The program which has recently evolved into what is now known as the Biorefinery, Renewable Chemical, and Biobased Product Manufacturing Assistance Program or “9003 Program” is managed by the Office of Rural Development (ORD). In 2022, leadership from the USDA - ORD requested an external review of the program as part of their efforts to identify aspects of the program that are working well as well as areas within the program that can be improved in all aspects to improve the service and impact of the program.

As part of the review process, the project team undertook literature research and conducted interviews with key stakeholders from across the country. This included those who represent various aspects of the 9003 ecosystem such as attorneys, private financial lenders, agricultural firms, engineering and technical experts, biobased energy, chemical and product manufacturing companies, brands and government officials.

As is presented in this report, all who were contacted emphasized the importance and need for the Biorefinery, Renewable Chemical, and Biobased Product Manufacturing Assistance Program and that the need is even greater now given the rapid commitments by governments and businesses around the country and world committing to a net-zero carbon economy which will be reliant on biobased solutions. All further emphasized that an effective 9003 program can provide support to rural America through agriculture and biobased manufacturing. Further, external stakeholders consistently commented on the very high level of professionalism, curtesy and responsiveness provided by the staff managing the 9003 program.

However, the majority of those interviewed also expressed critical points of view as to the effectiveness of the program to date and the need for meaningful organizational and procedural changes to meet the growing demands of the same constituents. There was unanimity in commending USDA-ORD

leadership in undertaking this external evaluation and shared hope that the recommendations provided in this report submitted by the stakeholders will be evaluated for implementation and result in meaningful improvements.

Finally, as is presented in this report, there are only two full time employees dedicated to the program which means the office is significantly understaffed especially in comparison to the US Department of Energy's Loan Program Office (LPO) which this project team believes has had a significant impact on the outreach, marketing, management and overall success of the 9003 program.

# KEY FINDING #1

## 11.3% SUCCESSFUL LOAN APPLICATION RATE

In our review of available records provided by the 9003-program office as well as interviews with individuals and institutions involved in the loan guarantee application process (Phase I and/or Phase II) the review team was able to identify 62 unique organizations that have entered the 9003-loan guarantee application process since 2008<sup>1</sup>. Of all those applications seven (7) or 11.3% have successfully completed the 9003-loan guarantee process and received financing by a private lender as presented in Table # ES-1:

YEAR	PROJECT NAME	LOAN AMOUNT	TECHNOLOGY	FEEDSTOCK	PRODUCT	LENDER	LOCATION	CURRENT STATUS
1	2009 Range Fuels	\$80,000,000	Biomass Gasification	Cellulosic - Wood	Ethanol	N/R	Soperton, GA	Never operated then closed / Sold to Lanza Tech in 2012 for \$5.4 M (Freedom Pines Biorefinery) is operating
2	2009 Sapphire	\$43,600,000	Refining at Dynamics Fuels in Geismar, LA	Algae	various types of transportation fuels	N/R	Columbus, NM	Loan Paid Off. 2017 sold off. Biorefinery closed
3	2011 INEOS Bio	\$75,000,000	gasification and fermentation	Cellulosic Wastes	bioethanol + renewable power	N/R	Vero Beach, FL	Plant constructed and operated. Sold to Franks Energy in 2017
4	2011 Fremont Community Digester	\$12,825,000	anaerobic digester	Liquid Organic Wastes	2.8 MW Renewable Electricity	N/R	Freemont, MI	2017 acquired by Generate Capital
5	2017 Ryze Renewables	\$112,580,000	Isotherm Hydroprocessing	Non-edible Distillers Corn Oil	Renewable Diesel, Naphtha, Propane	Greater Nevada Credit Union	Storey County, NV	Now known as New Rise Renewables Reno LLC. Project not completed. Entered into ground sale and leaseback with Twain Financial Partners April 2022.
6	2017 Ryze Renewables	\$198,000,000	Isotherm Hydroprocessing	Non-edible Distillers Corn Oil	Renewable Diesel, Naphtha, Propane	Greater Nevada Credit Union	Las Vegas, NV	Pending Update from Greater NV
7	2021 BC Organics	\$100,000,000	Aneorobic Digestion	Dairy Manure & Food Wastes	Renewable natural gas, nutrient stream, and clean water	Live Oak Bank	Greenleaf, WI	Under Construction in 2022

**Table ES-1.** Summary of 9003 loan applicants that were successful in obtaining a USDA conditional commitment and private lender loan since 2009. As of the September 2022, two of the approved projects are currently operating and producing renewable energy. *Note:* N/R represents no record in the 9003 database.

<sup>1</sup> As presented in this report, the records of the program are not complete.

## **KEY FINDING #2**

### **SINCE 2015 THE PROGRAM HAS DRAWN BROAD SPECTRUM OF APPLICATIONS**

Since 2015 Phase 2 applications have included a broad range of applications by both the type of feedstocks, end products as well as the geography of the applicants.

Woody Biomass accounted for the largest feedstock (20%) followed by “Other (12.4%), Corn Oil (10%), Agriculture Waste (9.6%) and Soybean / Canola Oil (7.9%) as well as Algal Biomass, Sugars, Waste Fats, Corn Stove, Poultry Litter, MSW and both Animal and Food Wastes.

Biofuels accounted for the largest primary product of the applications followed by Biochemicals, Biofuels/Sustainable Aviation Fuels, Biobased Products, Renewable Energy with many of the applications having several products.

In aggregate companies based in the State of Louisiana had 13.5% percent of all the requested loan guarantees of all applications. They were followed in descending order: Nevada, California, Iowa, Mississippi, Oregon, Texas, North Carolina, North Dakota, Florida, Georgia, Tennessee, Utah, Maryland, Colorado, Wisconsin, Delaware, Illinois, Arkansas and Ohio. This represents a program which is drawing applicants from across the United States.

## KEY FINDING #3

### THE PROGRAM OFFICE NEEDS PRIORITIZING, RESOURCING AND MODERIZATION

From a managerial perspective, there exist multiple significant gaps in structure, leadership and systems of the 9003-program office that have not been historically addressed by the USDA and which become even more important moving forward. These include the need of:

1. Elevating the importance of the program within USDA at a time where significant investments are being rapidly made by Federal and State governments as well as industry to develop and expand climate-SMART commodities.
2. Leadership and staffing pulled from senior leadership in from the private venture capital and finance sectors which has seen successful results in other programs such as the DOE Loan Programs Office.
3. Updating to the most basic of operational software platforms to more effectively track and manage the life cycle of loan guarantee applications and which will also allow the office to track itself against key metrics as well to identify operational impediments throughout the application process.
4. As related to bullet #2, the development of a modern-day marketing and education program that leverages the vast opportunities with social-media and,
5. Resourcing the office, which is understaffed, and which is impacted by professionals gaining experience then leaving for higher salaries or being pulled for other duties. The DOE Loan Program Office (LPO) is well staffed – there are 109 federal employees and 80 contractors working the three programs under the LPO<sup>2</sup>. The 9003 Program at USDA is staffed by a total of seven (7) individuals with only two dedicated full time to the program.

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<sup>2</sup> This includes \$20B for partial loan guarantees in tribal programs, ~\$57B for advanced technology vehicle loans, ~\$62B for Innovative Clean Energy (Renewables, Fossil, Nuclear). Confirmed in correspondence with LPO Director on August 28, 2022

## KEY FINDING #4

### STRUCTURAL AND PROCESS IMPROVEMENTS ARE RECOMMENDED

As detailed in chapter 5 of this report, there are a number of recommendations. However, these are predicated on analyses and interviews which prioritize the need from a potential applicant and lender perspective. It is important to note that these must be balanced with the needs to protect the American taxpayer whose money is used as a guarantee if the loan fails. It is very obvious that the staff of the 9003 program take this responsibility very seriously and seek to ensure that any conditional commitment issued by the 9003 program has minimal risks to the American taxpayer. In part this may account for the low ratio of applications to loans guaranteed.

1. As the old adage states, “time is money” and that is even more true in regard to technology development and deployment to market. There is general consensus that the 9003 process takes too long in its current state to be effective. In part some of these time lags are due to circumstances beyond the control of the USDA such as lags in review by OMB as well as applicants rushing through the process without the proper due-diligence or financial experience.
2. The current twice a year application window further delays the process and should be modified to allow for on-going applications such as DOE’s LPO.
3. There exists a number of perceived operational impediments (see chapter 4) including potential administrative or statutory definitions which require evaluation and potential modifications.



## HOW TO CITE THIS REPORT

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Golden, J.S., Handfield, R., Falkenburg, N., Otis, A.J. and, A. Greenberg (2022). The Biorefinery, Renewable Chemical, and Biobased Product Manufacturing Assistance (9003) Program: An External Review Conducted for the U.S.D.A. Issued by the Dynamic Sustainability Lab at Syracuse University. Access at [www.DynamicsLab.org](http://www.DynamicsLab.org)

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Golden was appointed to the Board of Scientific Counselors to the U.S. EPA where he continues to serve and was previously on the UN Lifecycle Management Task Force. He was named an AT&T Industrial Ecology Fellow. Dr. Golden consults extensively for companies and governments around the world on the bioeconomy as well as the transition to the net-zero carbon economy. Golden has been the lead author on a number of technical reports for the US government and for academic and industry publications on the Biobased economy. He is currently finishing work on his new book entitled, “Dynamic Sustainability” by Cambridge University Press.

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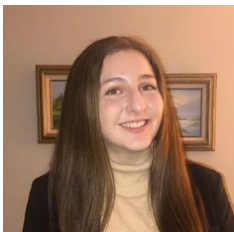
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## GLOSSARY OF TERMS

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The definitions, abbreviations and terms used for the 9003 program as defined § 4279.202 and § 4287.302.

*Administrator.* The Administrator of Rural Business-Cooperative Service within the Rural Development mission area of the U.S. Department of Agriculture.

*Advanced biofuel.* Fuel derived from Renewable Biomass, other than corn kernel starch, to include:

- (1) Biofuel derived from cellulose, hemicellulose, or lignin;
- (2) Biofuel derived from sugar and starch (other than ethanol derived from corn kernel starch);
- (3) Biofuel derived from waste material, including crop residue, other vegetative waste material, animal waste, food waste, and yard waste;
- (4) Diesel-equivalent fuel derived from Renewable Biomass, including vegetable oil and animal fat;
- (5) Biogas (including landfill gas and sewage waste treatment gas) produced through the conversion of organic matter from Renewable Biomass;
- (6) Butanol or other alcohols produced through the conversion of organic matter from Renewable Biomass; and
- (7) Other fuel derived from cellulosic biomass.

*Affiliate.* An entity that is related to another entity by owning shares or having an interest in the entity, by common ownership, or by any means of control.

*Agency.* The Rural Business-Cooperative Service or successor Agency assigned by the Secretary of Agriculture to administer the Program. References to the National or State Office should be read as prefaced by “Agency” or “Rural Development” as applicable.

*Agricultural producer.* An individual or entity directly engaged in the production of agricultural products, including crops (including farming); livestock (including ranching); forestry products;

hydroponics; nursery stock; or aquaculture, whereby 50 percent or greater of their gross income is derived from the operations.

*Annual renewal fee.* A fee that is paid once a year by the Lender and is required to maintain the enforceability of the Loan Note Guarantee.

*Arm's length transaction.* A transaction between ready, willing, and able disinterested parties that are not affiliated with or related to each other and have no security, monetary, or stockholder interest in each other.

*Assignment Guarantee Agreement.* Form RD 4279-6, "Assignment Guarantee Agreement," is the signed agreement between the Agency, the Lender, and the Holder containing the terms and conditions of an assignment of a guaranteed portion of a loan, using the single Promissory Note system.

*Association of Agricultural Producers.* An organization that represents Agricultural Producers and whose mission includes working on behalf of such producers and the majority of whose membership and board of directors is comprised of Agricultural Producers.

*BAP.* Biorefinery, Renewable Chemical, and Biobased Product Manufacturing Assistance Program.

*Biobased product.* A product determined by the Secretary to be a commercial or industrial product (other than food or feed) that is either:

- (1) Composed, in whole or in significant part, of biological products, including renewable domestic agricultural materials and forestry materials; or
- (2) An intermediate ingredient or feedstock.

*Biobased product manufacturing.* The use of Technologically New Commercial-Scale processing and manufacturing equipment and required facilities to convert Renewable Chemicals and other biobased outputs of Biorefineries into end-user products on a Commercial Scale.

*Biofuel.* A fuel derived from Renewable Biomass.

*Biogas.* Renewable Biomass converted to gaseous fuel.

*Biorefinery.* A facility (including equipment and processes) that converts Renewable biomass or an intermediate ingredient or feedstock of Renewable biomass into any one or more, or a combination, of Biofuels, Renewable chemicals or Biobased products, and may produce electricity.

*Bond.* A form of debt security in which the authorized issuer (Borrower) owes the Bond holder (Lender) a debt and is obligated to repay the principal and Interest (coupon) at a later date(s) (maturity). An explanation of the type of Bond and other Bond stipulations must be attached to the Bond issuance.

*Borrower.* The Person that borrows, or seeks to borrow, money from the Lender, including any party liable for the loan except for guarantors.

*Byproduct.* An incidental or secondary product generated under normal operations of the proposed Project that can be reasonably measured and monitored other than: Advanced Biofuel, Program-eligible Biobased Products including Renewable Chemicals, and Program-eligible end-user products produced by Biobased Product Manufacturing facilities. Byproducts may or may not have a readily identifiable commercial use or value.

*Calendar quarter.* Four three-month periods in each calendar year as follows:

- (1) Quarter 1 begins on January 1 and ends on March 31;
- (2) Quarter 2 begins on April 1 and ends on June 30;
- (3) Quarter 3 begins on July 1 and ends on September 30; and
- (4) Quarter 4 begins on October 1 and ends on December 31.

*Collateral.* The asset(s) pledged by the [Borrower](#) to secure the loan.

*Commercial-scale (commercial scale).* An operation is considered to be a Commercial-Scale operation if it demonstrates that its sole or chief emphasis is on salability and profit and:

- (1) Its revenue will be sufficient to recover the full cost of the Project over its expected life and result in an anticipated annual rate of return sufficient to encourage investors or Lenders to provide funding for the Project;

(2) It will be able to operate profitably without public and private sector subsidies upon completion of construction (volumetric excise tax is not included as a subsidy);

(3) Contracts for feedstock are adequate to address proposed off-take; and

(4) It has the ability to achieve market entry, suitable infrastructure to transport product to its market is available, and the technology and related products are generally competitive in the market.

*Conditional Commitment.* Form RD 4279-3, “Conditional Commitment,” is the Agency's notice to the Lender that the loan guarantee it has requested is approved subject to the completion of all conditions and requirements set forth by the Agency and outlined in the attachment to the Conditional Commitment.

*Conflict of interest.* A situation in which a Person has competing personal, professional, or financial interests that prevents the Person from acting impartially.

*Default.* The condition that exists when a Borrower is not in compliance with the Promissory Note, the Loan Agreement, security documents, or other documents evidencing the loan. Default could be a monetary or non-monetary Default.

*Deficiency judgment.* A monetary judgment rendered by a court of competent jurisdiction after foreclosure and liquidation of all Collateral securing the loan.

*Delinquency.* A loan for which a scheduled loan payment is more than 30 days past due and cannot be cured within 30 days.

*Eligible project costs.* Those expenses approved by the Agency for the Project as set forth in § 4279.210(d) and do not include the costs set forth in § 4279.210(e).

*Eligible technology.* The term “Eligible technology” means, as determined by the Secretary:

(1) A technology that is being adopted in a viable Commercial-scale operation of a Biorefinery that produces any one or more, or a combination, of an Advanced biofuel; a Renewable chemical; or a Biobased product; and

(2) A technology not described in paragraph (1) of this definition that has been demonstrated to have technical and economic potential for commercial application in a Biorefinery that produces any one or more, or a combination, of an Advanced biofuel, a Renewable chemical or a Biobased product.

*Fair market value.* The price that could reasonably be expected for an asset in an Arm's-Length Transaction between a willing buyer and a willing seller under ordinary economic and business conditions.

*Farm cooperative.* A business owned and controlled by Agricultural Producers that is incorporated, or otherwise recognized by the State in which it operates, as a cooperatively-operated business.

*Farmer Cooperative Organization.* An organization whose membership is composed of Farm Cooperatives.

*Feasibility study.* An analysis by an independent qualified consultant or consultants of the economic, market, technical, financial, and management feasibility of a proposed Project or business in terms of its expectation for success.

*Federal debt.* Debt owed to the Federal government that is subject to collection under the Debt Collection Improvement Act of 1996, 31 U.S.C. 3701 et seq. Once the Agency determines a debt is Federal Debt and provides notice to the Lender, that Federal Debt is excluded from Future Recovery.

*Future recovery.* Funds anticipated to be collected by the Lender after a final loss claim is processed.

*Good cause.* A justification representing a reasonable approach given:

- (1) The reasonably available alternatives;
- (2) All known relevant factors;
- (3) Program requirements; and
- (4) The best interests of the government. Good cause must be approved by the Agency. Without prior approval by the Agency, alternatives that require the Agency to increase its guarantee, in either the Conditional Commitment or Loan Note Guarantee (including an increase of its subsidy costs under the Credit Reform Act of 1990), or provide additional assistance, will not be considered reasonable

available alternatives under paragraph (1) of this definition or in the best interests of the government under paragraph (4) of this definition.

*Grossly negligent loan origination.* A serious carelessness in originating the loan which is so great as to appear to be conscious. The term includes not only the concept of a failure to act, but also not acting in a timely manner.

*Grossly negligent loan servicing.* A serious carelessness in servicing the loan which is so great as to appear to be conscious. The term includes not only the concept of a failure to act, but also not acting in a timely manner.

*Guaranteed Loan Report of Loss.* Form RD 449-30, “Guaranteed Loan Report of Loss,” used by Lenders when reporting a financial loss under an Agency guarantee.

*Holder.* A Person, other than the Lender, who owns all or part of the guaranteed portion of the loan with no servicing responsibilities.

*Immediate family(ies).* Individuals who live in the same household or who are closely related by blood, marriage, or adoption, such as a spouse, domestic partner, parent, child, sibling, aunt, uncle, grandparent, grandchild, niece, nephew, or cousin.

*Indian tribe.* This term has the meaning as defined in 25 U.S.C. 450b.

*In-house expenses.* Expenses associated with activities that are routinely the responsibility of a Lender's internal staff or its agents. In-house expenses include, but are not limited to, employees' salaries, staff lawyers, travel, and overhead.

*Institution of higher education.* This term has the meaning as defined in 20 U.S.C. 1002(a).

*Interest.* A fee paid by a Borrower to a Lender as a form of compensation for the use of money. When money is borrowed, Interest is typically paid as a fee over a certain period of time (typically months or years) to the Lender as percentage of the principal amount owed. The term Interest does not include Default or penalty Interest or late payment fees or charges.

*Interest Termination Date.* The date on which no further interest will be payable under the Loan Note Guarantee.

(1) If the Lender owns all or a portion of the guaranteed interest in the guaranteed loan or makes a Protective Advance, then the Loan Note Guarantee will not cover Interest to the Lender accruing after 90 days from the most recent Delinquency effective date as reported by the Lender.

(2) If the guaranteed loan has a Holder(s), the Lender, or the Agency, at its sole discretion, will issue an interest termination letter to the Holder(s) establishing the termination date for Interest accrual. The Loan Note Guarantee will not cover Interest to the Holder(s) accruing after the greater of:

(i) 90 days from the date of the most recent Delinquency effective date as reported by the Lender or

(ii) 30 days from the date of the interest termination letter.

*Lender.* The entity approved, or seeking to be approved, by the Agency to make, service, and collect the Agency guaranteed loan that is subject to this subpart.

*Lender's Agreement.* Form RD 4279-4, "Lender's Agreement," or predecessor form, between the Agency and the Lender setting forth the Lender's loan responsibilities.

*Liquidation expenses.* Costs directly associated with the liquidation of Collateral, including preparing Collateral for sale (e.g., repairs and transport) and conducting the sale (e.g., advertising, public notices, auctioneer expenses, and foreclosure fees). Liquidation Expenses do not include In-House Expenses. Legal/attorney fees are considered Liquidation Expenses provided that the fees are reasonable, as determined by the Agency, and cover legal issues pertaining to the liquidation that could not be properly handled by the Lender and its in-house counsel.

*Loan agreement.* The agreement between the Borrower and Lender containing the terms and conditions of the loan and the responsibilities of the Borrower and Lender.

*Loan classification.* The process by which loans are examined and categorized by degree of potential loss in the event of Default.



*Loan Note Guarantee.* Form RD 4279-5, “Loan Note Guarantee,” or predecessor form, issued and executed by the Agency containing the terms and conditions of the guarantee.

*Loan packager.* A Person, other than the applicant Borrower or Lender, that prepares a loan application package.

*Loan service provider.* A Person, other than the Lender of record, that provides loan servicing activities to the Lender.

*Local government.* A county, municipality, town, township, village, or other unit of general government below the State level, or Indian Tribe governments.

*Local owner.* An individual who owns any portion of an eligible Biorefinery and whose primary residence is located within a certain distance from the Biorefinery as specified by the Agency in a Notice published in the Federal Register.

*Market value.* The amount for which a property will sell for its highest and best use at a voluntary sale in an Arm's Length Transaction.

*Material adverse change.* Any change in circumstance associated with a guaranteed loan, including the Borrower's financial condition or Collateral that could be reasonably expected to jeopardize loan performance.

*NAD.* National Appeals Division, or successor agency, in the United States Department of Agriculture.

*Negligent Loan Origination.* The failure to perform those actions which a reasonably prudent lender would perform in originating its own portfolio of loans that are not guaranteed. The term includes not only the concept of a failure to act but also acting in a manner contrary to the manner in which a reasonably prudent lender would act.

*Negligent Loan Servicing.* The failure to perform those services which a reasonably prudent lender would perform in servicing (including liquidation of) its own portfolio of loans that are not guaranteed. The term includes not only the concept of a failure to act, but also not acting in a timely manner, or acting in a manner contrary to the manner in which a reasonably prudent lender would act.

*Off-take agreement.* The terms and conditions governing the sale and transportation of Biofuels, Biobased Products including Renewable Chemicals, Biobased Product Manufacturing end-user products, and electricity produced by the Borrower to another party.

*Parity.* A lien position whereby two or more Lenders share a security interest of equal priority in Collateral.

*Participate.* Sale of an interest in a loan by the lead Lender to one or more Lenders wherein the lead Lender retains the Promissory Note, Collateral securing the Promissory Note, and all responsibility for managing and servicing the loan. Participants are dependent upon the lead Lender for protection of their interests in the loan.

*Person.* An individual or entity.

*Phase 1:* Introduced in 2014 under the two-phase application process. Projects are scored by USDA and by their organization, lender, or feasibility study author. Score of 55 or higher required.

*Phase 2:* Introduced in 2014 under the two-phase application process. Second phase where projects must demonstrate 120 days of successful plant operation before funding obligation potential.

*Program.* Biorefinery Renewable Chemical, and Biobased Product Manufacturing Assistance Program often abbreviated as BAP.

*Project.* The facility or portion of a facility receiving funding under this subpart.

*Pro rata.* On a proportional basis.

*Promissory note.* Evidence of debt with stipulated repayment terms. “Note” or “Promissory Note” shall also be construed to include “Bond” or other evidence of debt, where appropriate.

*Protective advance.* An advance made by the Lender for the purpose of preserving and protecting the Collateral where the Borrower has failed to, and will not or cannot, meet its obligations to protect or preserve Collateral. Protective advances include, but are not limited to, advances affecting the Collateral made for property taxes, rent, hazard and flood insurance premiums, and annual assessments.

Legal/attorney fees are not a Protective Advance. Holders do not have an interest in Protective Advances.

*Public body.* A municipality, county, or other political subdivision of a State; a special purpose district; or an Indian Tribe on a Federal or State reservation or other Federally-recognized Indian Tribe; or an organization controlled by any of the above. A Local Government would also be a Public Body.

*Renewable biomass.*

(1) Materials, pre-commercial thinnings, or invasive species from National Forest System land or public lands (as defined in section 103 of the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1702)) that:

(i) Are byproducts of preventive treatments that are removed to reduce hazardous fuels; to reduce or contain disease or insect infestation; or to restore ecosystem health;

(ii) Would not otherwise be used for higher-value products; and

(iii) Are harvested in accordance with applicable law and land management plans and the requirements for old-growth maintenance, restoration, and management direction of paragraphs (2), (3), and (4) of subsection (e) of section 102 of the Healthy Forests Restoration Act of 2003 (16 U.S.C. 6512) and large-tree retention of subsection (f) of section 102; or

(2) Any organic matter that is available on a renewable or recurring basis from non-Federal land or land belonging to an Indian or Indian Tribe that is held in trust by the United States or subject to a restriction against alienation imposed by the United States, including:

(i) Renewable plant material, including feed grains; other agricultural commodities; other plants and trees; and algae; and

(ii) Waste material, including crop residue; other vegetative waste material (including wood waste and wood residues); animal waste and byproducts (including fats, oils, greases, and manure); and food waste and yard waste.

*Renewable chemical.* A monomer, polymer, plastic, formulated product, or chemical substance produced from Renewable Biomass.

*Retrofitting.* The modification of a building or equipment to incorporate functions not included in the original design.

*Rural Development.* The mission area of USDA that is comprised of the Rural Business-Cooperative Service, Rural Housing Service, and Rural Utilities Service and is under the policy direction and operational oversight of the Under Secretary for Rural Development.

Rural or rural area. As described in 7 U.S.C. 1991(a)(13)(A), (D), (H) and (I).

Secretary. The Secretary of the Department of the Agriculture.

*Semi-work scale.* A facility operating on a limited scale to provide final tests of a product or process.

*Spreadsheet.* A table containing data from a series of financial statements of a business over a period of time. Financial statement analysis normally contains Spreadsheets for balance sheet and income statement items and includes a cash flow analysis and commonly used ratios. The Spreadsheets enable a reviewer to easily scan the data, spot trends, and make comparisons.

*State.* Any of the 50 States of the U.S., the Commonwealth of Puerto Rico, the U.S. Virgin Islands, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, the Republic of Palau, the Federated States of Micronesia, and the Republic of the Marshall Islands.

*Subordination.* The reduction of the Lender's lien priority on certain assets pledged to secure payment of the guaranteed loan to a position junior to, or on Parity with, the lien position of another loan in order for the Borrower to obtain additional financing, not guaranteed by the Agency, from the Lender or a third party.

*Technologically New.* New or significantly improved equipment, process or production method to deliver a product, or adoption of equipment, process or production method to deliver a new or significantly improved product, of which the first Commercial-Scale use in the United States is within the last five years and is used in not more than three Commercial-Scale facilities in the United States.

*Total project costs.* The sum of all costs associated with a completed Project.

*Transfer and assumption.* The conveyance by a Borrower to an assuming Borrower of the assets, Collateral, and liabilities of the loan in return for the assuming Borrower's binding promise to pay the outstanding loan debt approved by the Agency.

*USDA Lender Interactive Network Connection (LINC).* The portal Web site currently at <https://usdalinc.sc.egov.usda.gov/> used by Lenders to update loan data in the Agency's Guaranteed Loan System. Current capabilities include loan closing and status reporting.

*Well capitalized.* Federal Deposit Insurance Corporation (FDIC) requirements used to determine if a lending institution has enough capital on hand to withstand negative effects in the market, and which the Agency uses to determine Lender eligibility. The criteria are specified in the Federal Deposit Insurance Act, and are currently at 12 CFR 325.103, or subsequent regulation.

*Withdrawn/Expired Applications (WEA).* Applications that did not receive obligated funds and that have withdrawn from the program or their application has expired.

*Woody Biomass.* Any woody material from trees or shrubs.<sup>3</sup>

*Working capital.* Current assets available to support a business's operations. Working Capital is calculated as current assets less current liabilities.

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<sup>3</sup><https://extension.psu.edu/a-primer-on-woody-biomass-energy-for-forest-landowners#:~:text=What%20is%20Woody%20Biomass%3F,cannot%20be%20used%20for%20timber.>

# 1. Introduction: General Overview





## 1.0 Overview

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We are at a unique place in time where the opportunities and needs for the Biorefinery, Renewable Chemical, and Biobased Product Manufacturing Assistance Program (aka the 9003 Program) have never been stronger. The United States and especially the rural regions of our nation have an unprecedented opportunity for economic growth and job creation. Around the globe both governments and especially all industrial sectors including retail, brands, manufacturing, financial etc are committing to net-zero carbon emissions for which biobased and climate smart commodities will play a pivotal role.

The most recent analysis of the economic and job benefits from the biobased economy in the United States (Daystar et al., 2020) indicated that the total contribution of the biobased products industry to the U.S. economy in 2017 was \$470 billion, employing 4.6 million workers. It was estimated that each job in the U.S. biobased industry supported 1.79 jobs in other sectors of the domestic economy. As impressive as these numbers are, the opportunities for an even more expansive growth is now being realized.

A recent study (Forbes, 2021) indicates that at least a fifth of the world's largest companies have committed to net-zero carbon emissions ranging from 2035 to 2050. This includes the world's largest retailer-Walmart all the way to the world's airline industry in large part by the utilization of sustainable aviation fuels (SAF) produced from biobased feedstocks. As presented in Golden et. al (2021) the U.S. chemical sector is the second largest in the world after China and produces 15% of the world's chemicals, produces more than 70,000 diverse products and is responsible for more than a quarter of U.S. GDP.

More than 96% of U.S. goods manufactured in 2016 and used in our everyday lives contained chemical sector products. Today, many of these products are produced using chemicals derived from finite and non-renewable fossil and mineral feedstocks and major retailers and manufacturers have issued public statements committing to transitioning to low-carbon and climate-smart products based renewable biobased feedstocks.

In fact, a recent global industry analysis (GIA, 2022). Estimates that the global renewable chemicals market is set to reach \$125.7B as soon as 2025. Similarly, the global sustainable aviation fuel market is projected to grow from \$219 million in 2021 to \$15.7 billion by 2030, at a CAGR of 60.8% during the forecast period (PR Newswire, 2022).

If the United States is to play a leading role in this expanding market segment, the Biorefinery, Renewable Chemical, and Biobased Product Manufacturing Assistance Program (9003) will most certainly be a pivotal catalyst.

The United States with its unparalleled agricultural resources coupled with manufacturing infrastructure offers a competitive advantage to meet global demands for green technologies with a specific focus on biobased – climate/smart chemicals, fuels and products. Hence the 9003 Program can play a pivotal role if the United States will be able to realize these economic, job and environmental opportunities.

As a result of these drivers, the leadership within the US Department of Agriculture Office of Rural Development (ORD) requested an external review of the 9003 Program so as to inform on past and current operational effectiveness and to identify, primarily through interviews with stakeholders from around the country on opportunities to make the 9003 Program more impactful and user-friendly at this critical juncture.

To accomplish this analysis, the project team<sup>4</sup> undertook extensive literature research as presented in chapter 2, data analyses of 9003 applications (chapter 3) as well as conducting formal interviews across the country<sup>5</sup> (chapter 4) with a broad segment of business sectors and government organizations associated with the 9003 program including biochemical and biobased product companies, lenders and the financial sector, attorneys representing those in the biobased economy, biobased related industry associations, current and former government agency personnel as well as academic researchers. Our recommendations are presented in chapter 5.

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<sup>4</sup> A partial listing of prior research & reports relating to the Biobased economy is located in the reference section of chapter 1.

<sup>5</sup> All interviews were conducted under an Institutional Review Board (IRB) process (22-059) authorized through the Office of Research Integrity and Protection at Syracuse University. The interviewees names and organizations are kept confidential.



## 1.1 The role of the 9003 Program

There are various mechanisms for a company to explore in order to finance the development of a new technology and/or manufacturing facility either through equity or as debt as presented in table 1.1. Each of these options result in certain risks as well as impacts to equity as well as operational and managerial control. The U.S. government, similar to many governments around the world, provides loan guarantees for specific areas of national prioritization.

Government loan guarantees eliminate the default risk to the lender by shifting it entirely to the government, enabling the borrower to obtain much more favorable loan rates. Often, without the guarantee, the loan would not have been approved at all or, the interest rate will be very high. If companies do not utilize the USDA 9003 program they can likely can find a new source of capital but will likely be a more a more expensive form of capital spanning from venture capital all the way to municipal bonding.

<b>EQUITY</b>		
Grants	Federal & State	USDA, DOE and DOT etc.
Angel Funding	Includes Crowdfunding	Ex. Sequoia, Benchmark, Tiger Global, etc.
Venture Capital Equity	Focus on startups and emerging companies	Ex. Apollo, Blackstone, TPG etc.
Private Equity	Investment in company shares that are not publicly listed. This investment capital is provided by individuals or firms	
Strategic Equity		
Infrastructure Funds Equity		
State Green Banks	Such as State of New York Green Bank, Connecticut, Hawaii, etc.	
International Green Banks	Approximately 36 countries as of 2022	
Tax Equity	ITCs, PTCs,	
Sponsor Equity	Includes Hedge Funds & Developers	
Portfolio Equity		
<b>DEBT</b>		
Loan Guarentees- Low Cost Long Term Financing		
USDA 9003 Program	The Biorefinery, Renewable Chemical, and Biobased Product Manufacturing Assistance Program	~ \$1 Billion available
USDA 9007 Program	Project primarily for clean energy	~ \$300 Million available
Department of Energy	Title 17 Loan Programs Office	date
Department of Energy	Section 1703 Renewable Energy & Energy Efficiency	programs
Green Bonds	Administered by International Capital Markets Association	Expected to grow to ~1 - 2 Trillion
International Debts	US Export Import Bank, Overseas Private Investment Corp, Int Finance Corp etc.	

**Table 1.1.** Forms of finance for sustainable manufacturing facilities. Adapted from Reidy, 2018.

The 9003 program provides a higher level of loan guarantees up to \$250 million as compared to the USDA 9007 Rural Energy for America Program (REAP) providing loan guarantees of up to \$25 million to businesses located in rural areas with populations of 50,000 residents or less.<sup>6</sup> Similarly the 9003 program is more expansive than the USDA OneRD Guarantee Loan Initiative: Business and Industry Loan Guarantees used by lenders for and non-profits, cooperatives, public bodies, tribes and individuals engaged in an eligible business are able to receive a guarantee of up to 80%<sup>7,8</sup>. These programs allow the use of commercially available technology as compared to 9003 program hence, the risk has been minimized in the loan and lenders are more available and likely to provide these smaller loans.

New, innovative, first-of-kind technology is the intention of the 9003 Program. It has a much higher risk profile, serial number 3 or below, and lower TRLs (technology), FRLs (feedstock), and MRLs (manufacturing). Hence the need for \$250 million max guarantee cap, greater investment, higher cap ex, and more rigorous technical diligence.

The 9003 loan guarantee is **not** meant to fund laboratory research and experiments. It is intended to advance science, engineering, and technology to bring new biofuels, renewable chemicals, and biobased products into the marketplace cost effectively. A big part of the 9003 application process is the need for an integrated demonstration unit which is in the legislation since all units of operation being proposed for the first-of-kind facility must be demonstrated and documentation on minimum 120 day duration, and feedstock & output quantity and quality provided. While some of the units are new technologies, other units may be commercially available already. It is the integration of units that must be demonstrated even if a portion of the units are commercially available. This is to protect taxpayer investment, de-risk the project, improve the efficiency and profitability of the facility, and ensure repayment of the loan.

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<sup>6</sup> Agricultural producers may be in rural or non-rural areas

<sup>7</sup> In FY2022

<sup>8</sup> Typical loans span from \$200,000 to \$5,000,000

## **1.2 Application Process Overview**

As detailed in chapter 2 of this report, what we now know as the Biorefinery, Renewable Chemical, and Biobased Product Manufacturing Assistance Program (aka the 9003 program) has its origins back to 2002 and Congressional inclusion in the Farm Bill as the Biorefinery Development Program. The 9003 program is not a loan that is provided directly to the originating business rather, the program authorizes the USDA to guarantee loans of up to \$250 million to develop, build, or retrofit facilities to support new and emerging technologies, and produce advanced biofuels, renewable chemicals, and biobased products (definitions are available under Subpart C, Section 4279.202)

- The project must be located in a U.S. state or territory.
- The maximum federal participation (all federal loans or grants) is 80 percent of all eligible project costs.
- The borrower and other involved principals must make a significant cash equity contribution investment.
- Term – 20 years. Interest rates are fixed, variable or a combination of both.
- Fees – 1% - 2% of senior debt at closing and 0.5% - 1.0% annual renewal fee with 80% senior debt coverage, depending on size of project. 3% of senior debt at closing and 1% annual renewal fee with 90% senior debt coverage.
- Parent Guarantees may be negotiated downward or eliminated under the new Interim Final Rule through a new non-recourse “project financing” structure.

### **1.2.1 Who can apply?**

Eligible borrowers include individuals, corporations, and cooperatives with eligible lenders. Examples include:

- Federal or state-chartered banks
- Federally-recognized Tribes
- Farm credit institutions with direct lending authority
- Credit Unions examined or supervised by a state agency or the National Credit Union Administration
- The National Rural Utilities Cooperative Finance Corporation

### **1.2.2 Lender Eligibility Requirements**

An eligible lender is any federal or state-chartered bank, Farm Credit Bank, other Farm Credit System institution with direct lending authority, or bank that serves cooperatives. The lender must demonstrate it meets Federal Deposit Insurance Corporation (FDIC) definition of “well capitalized” at the time of application and issuance of the Loan Note Guarantee.

### **1.2.3 Definitions of Eligibility**

- Biobased product manufacturing — The use of Technologically New Commercial-Scale processing and manufacturing equipment and required facilities to convert Renewable Chemicals and other biobased outputs of Biorefineries into end-user products on a Commercial Scale
- Biorefinery — A facility (including equipment and processes) that converts Renewable Biomass into Biofuels and Biobased Products and may produce electricity
- Renewable chemical — A monomer, polymer, plastic, formulated product, or chemical substance produced from Renewable Biomass.
- Advanced biofuel— Fuel derived from Renewable Biomass, other than corn kernel starch.

### **1.2.4 The Two Phases of the Application**

In the period before 2014, applicants needed to have parts 1 and 2 completed to apply, as well as having a lender standing ready with the loan guarantee. So, this meant that the applicant had to complete the feasibility studies, having the independent engineers’ reports, the environmental report, a solid credit rating analysis from a national credit agency, as well as having the EPC<sup>9</sup> and feedstock agreements established and in place. In the 2014 Farm Bill, a two-part process was introduced (Table #1.2) – where the company first submits the feasibility study, and if that is deemed credible and scored appropriately, they get a green light and are accepted into the Part 2 process and complete the other requirements including the integrated demonstration unit (IDU).

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<sup>9</sup> EPC = Engineering Procurement Contractor. This is the engineering and construction firm that will design and construct the production facility.

- The phase I application requires sufficient information to be provided from the project owner and the lender of record for USDA to determine that the proposed project meets the eligibility provisions of the program. Phase 1 requires 60 – 90 days to complete, and is a comprehensive assessment of risk, including financial, management, and socio-economic benefits. Once completed, the lender and project applicant have to sign a letter of intent and the lender is expected to do their own due diligence.
- The phase II application contains the information for USDA to determine if the project merits the issuance of a loan guarantee to the lender of record. Phase 2 is when the USDA can issue conditional commitment – until this point, funds are not set aside. Commitment takes place after meeting with the Office of Management and Budget for credit scoring on the process takes place. There may be other conditions put on the project, which takes additional time. The requirement here is that the project must construct a commercial scale facility with an integrated demonstration unit for a novel technology to prove the concept – and has to produce enough offtake to send to offtake agreement companies.

Phase	Borrower	Packager	USDA	Lender
Phase I		Letter of Intent		Preliminary Term sheet
	Application Form	From Borrower		
	Financial Statements	From Borrower		
	Financial Model	From Borrower		
	Feasibility Study	From Borrower		
	Business Plan	From Borrower		
	Scoring Information	From Borrower		
	Intergovernmental Consultation	From Borrower		
	Other Information	From Borrower		
		Application Submission to USDA - Place Holder		
Phase II	Technical Assessment/Technical Report	From Borrower		Lender's Analysis, Credit Evaluation, and Supporting Materials
	Environmental Assessment or Environmental Report	From Borrower		
	Contracts	From Borrower		
	Update Feasibility Study	From Borrower		
	Credit Rating	From Borrower		
		Appraisals	USDA Closing Documents Review	Proposed Loan Agreement
	Draft USDA Conditional Commitment		Draft USDA Conditional Commitment	Draft USDA Conditional Commitment
			USDA Loan Committee Approval	
			USDA Office of Budget Review	
			Office of Management and Budget Review	
	Draft Loan Closing Documents		USDA Approval	Draft Loan Closing Documents
	Borrower Counsel Opinion on Enforcement of Loan Documents – All Contracts		USDA Closing Documents Review	Issuance of Title Insurance Commitment with ALTA certification
Loan Closing		Loan Closing	Loan Closing	
			Obtain USDA Loan Note Guarantee	
			Loan Funding	

**Table 1.2.** General overview of the two phase 9003 application process.

### 1.2.5 Scoring Process

USDA Rural Development will score each eligible application that meets the minimum requirements for technical and economic feasibility<sup>10</sup>. A maximum of 125 points is possible. The scoring has fifteen different criteria including:

1. Degree of commitment on off-take agreements-six points
2. Duration of off-take agreements-six points

<sup>10</sup> 7 CFR Part 4279.266 – available at: <https://go.usa.gov/xJEsQ>

3. Financial strength of the off-take counterparty-four points
4. Revenue dependency on sales tax credits, carbon credits, or other federal or state subsidies-four points
5. Whether the area in which the borrower proposes to locate the project (defined as the area that will supply the feedstock to the proposed project), has any other similar facilities-five points
6. Whether the borrower is proposing to use a feedstock or biobased output of biorefineries not previously used in the production of advanced biofuels or biobased products, including renewable chemicals-ten points
7. Whether the borrower proposes to work with producer associations or cooperatives-five points
8. The level of financial participation by the borrower, including support from nonfederal government sources and private sources-twenty points
9. Whether the borrower has established that the process proposed will have a positive effect on three impact areas: resource conservation (such as water, soil, forest), public health (potable water, air quality), and the environment (meeting renewable fuel standards, reducing greenhouse gas emissions or particulate matter)-ten points.
10. Whether the borrower can establish that the proposed technology will not have any economically-significant negative impact on existing manufacturing plants or other facilities using similar feedstocks or biobased outputs-five points.
11. The potential for rural economic development-twenty points.
12. The level of local ownership of the facility proposed in the application-five points.
13. Whether the project can be replicated-ten points.
14. If the project uses a particular technology, system, or process that was not operating at commercial scale as of October 1 of the fiscal year for which the funding is available-five points.

15. The USDA Rural Business-Cooperative Service Administrator can award up to a maximum of 10 bonus points, as follows:

- a. a. To ensure diversity in the types of projects approved for loan guarantees, and promote as wide a range as possible in the types of technologies, products and approaches supported in the USDA Rural Development Energy Program portfolio.
- b. b. To applications that promote partnerships and activities that help develop new and emerging technologies to increase U.S. energy independence, or reduce our dependence on petroleum-based chemicals and products; promote resource conservation, public health, and the environment, diversify agricultural and forestry product markets uses for agriculture waste, and create jobs and enhance the economic development of the rural economy. These partnerships and other activities are identified in a Federal Register notice each fiscal year



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## 2. Background of the 9003 Program



## 2.1 Farm Bill History and Section 9003 Origins

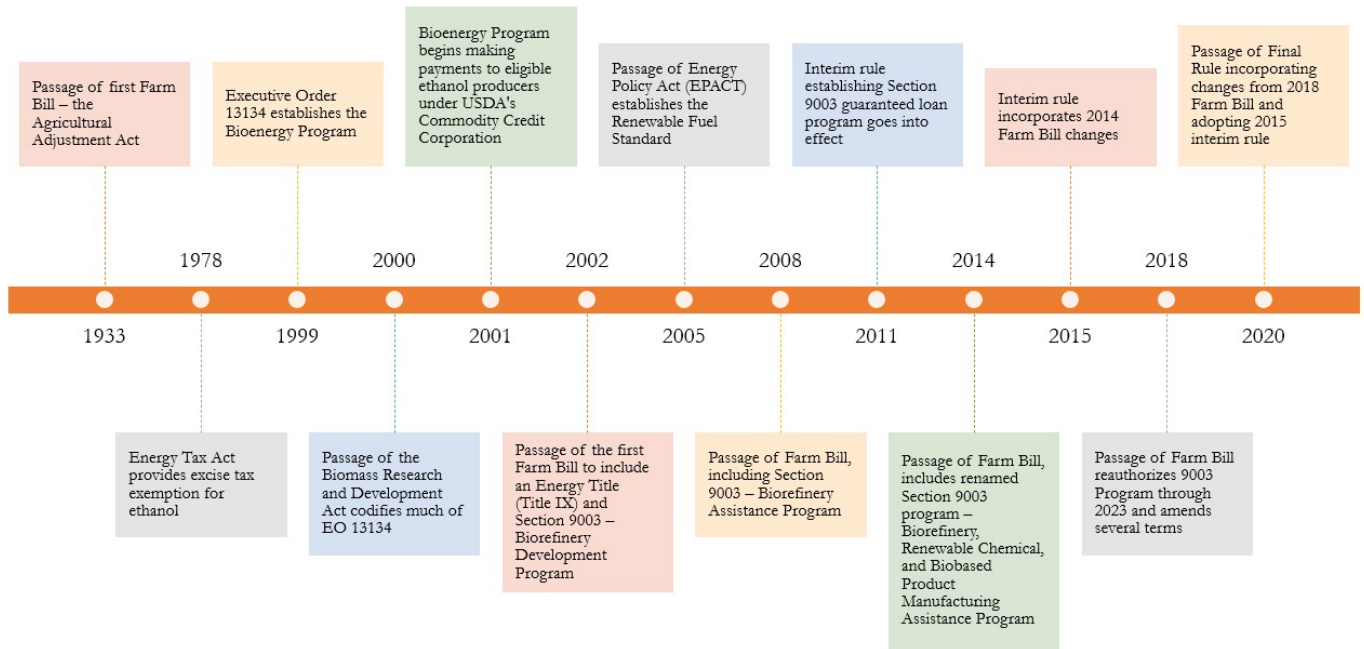
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Agricultural policy in the first one hundred years of the United States was predominantly concerned with redistributing land from the federal government to private ownership. The Homestead Act of 1862 is one example of early agricultural policy, which provided land to male citizens, widows, single women, and immigrants at no cost, as long as it was the primary residence and used for cultivation (NPS, 2022). This redistribution of land involved displacing native peoples, moving them to reservations, and settling white colonists on lands previously managed by native tribes. In the 1880s, after the passage of the Dawes Act, the federal government broke up reservations by providing land to individual Native Americans and giving other native land to settlers (National Archives, 2022).

In the late 1800s and early 1900s, agricultural policy shifted away from private distribution and toward education, research and development. In this period, the USDA and extension services were created, alongside land grant colleges, and the appropriation of funding for agricultural research at state experiment stations (USDA, 2000). Following WWI, which saw an over-production of food globally and sharp decline in federal crop pricing, congress sought to control agricultural production and improve farm credit. However, it was not until the depression, and FDR's New Deal response, that farmers received price supports and supply management. This was delivered through the first Farm Bill, titled the Agricultural Adjustment Act of 1933. Through the bill, farmers were able to receive federal subsidies in exchange for agreeing to reduce production of certain commodity crops. This price control mechanism would continue to be a key feature of future Farm Bills (Library of Congress, 2022).

As presented in Figure 2.1, since 1933, the Farm Bill has been renewed on a regular basis, about every five years, and to date the US has passed 18 farm bills. The Farm Bill has grown to include federal crop insurance, soil conservation programs, food assistance programs, such as the Supplemental Nutrition

Assistance Program (SNAP), and energy programs in Title IX, first included in the 2002 Farm Bill (Library of Congress, 2022).



**Figure 2-1** Timeline of the Farm Bill

### **2.1.1 Origins of the 9003 Program**

In crafting Title IX, the energy title of the Farm Bill, in 2002 DOE, USDA, and their congressional liaisons cooperated to create and fund programs to support a biobased economy. The partnership between DOE and USDA was initiated by Executive Order 13134 in 1999 and codified by the Biomass Research and Development Act in 2000. Through regular meetings of the Technical Advisory Committee and R&D board created under the act, DOE and USDA laid the groundwork for the first iteration of the Section 9003 Program, which was included in the 2002 Farm Bill, and named the Biorefinery Development Program.

The program was initially conceived of as a grant program to help finance the cost of developing and constructing biorefineries and biofuel production plants to demonstrate the commercial viability of converting biomass to fuels or chemicals. However, no mandatory funding was authorized for the program and no discretionary funding was appropriated for the program. Therefore, the USDA did not develop implementation regulations (CRS, 2007). However, through continued engagement of the



Technical Advisory Committee and R&D board, DOE and USDA continued to work on biobased issues. The creation and eventual adoption of the Renewable Fuels Standard in the 2005 Energy Policy Act was another outgrowth of this collaboration between the two agencies, and likely fueled support for expansion and funding of the 9003 Program in the 2008 Farm Bill.

The 2008 Farm Bill replaced the Biorefinery Development Program, renaming it the Biorefinery Assistance Program (BAP). In the House Agriculture committee, which produced the first draft of the Farm Bill, USDA and DOE worked with members of both parties to craft compromises regarding the program, especially related to funding. The eventual 2008 Farm Bill was sponsored by Representative Collin Peterson, a Democrat from Minnesota, and Chair of the House Agriculture committee. The 9003 Program in the 2008 Farm Bill used the Biorefinery Development Program as a starting point, but effectively reimagined the program as based in loan guarantees, as well as grants, which was likely more politically feasible. The BAP assisted in the development of new and emerging technologies for advanced biofuels, renewable chemicals, and biobased products.

Authority was given to USDA to provide assistance through competitive grants and loan guarantees for construction and retrofitting of demonstration-scale biorefineries to demonstrate commercial viability for converting renewable biomass to advanced biofuels. The biorefinery grants under the BAP could provide for up to 30% of total project costs and each loan guarantee was limited to \$250 million, or 80% of the project cost. Congress provided mandatory funds for the loan guarantee portion of BAP and authorized discretionary funds for the grant portion. At final passage, Congress appropriated funding for the loan guarantee portion of the program, but did not appropriate discretionary funds for the grant portion. No discretionary funds have since been appropriated for the grant portion in future farm bills (CRS, 2019).

Since its inclusion and subsequent funding in the 2008 Farm Bill, the 9003 program has also been reauthorized in the 2014 and 2018 Farm Bills. The program has seen significant legislative changes since 2008, which are included in the following section. The expansion of the program in 2014 to include biobased product manufacturing was a result of significant lobbying efforts on behalf of the chemical and biobased product manufacturing sectors, as growth in these sectors has outpaced the biofuel sector.

## **2.2 Farm Bill Politics Since 2008**

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### **2.2.1 2008 Farm Bill Passage**

On May 8, 2008, House and Senate farm bill conferees announced the details of a completed conference agreement (H.R. 2419, the Food, Conservation, and Energy Act of 2008). On May 14, 2008, the House passed the conference agreement on the 2008 farm bill by a vote of 318-106. On May 15, the Senate passed the same bill by a vote of 81-15. On May 21, 2008, the Bush Administration vetoed the legislation. The House voted to override the veto by a vote of 316-108 also on May 21, followed by a Senate veto override by a vote of 82-13 the next day. On May 22, the 2008 farm bill was enacted into law (P.L. 110-234).

However, an enrolling error resulted in one title of the bill (Title III, Trade) being omitted from the version that was sent to the White House. The newly enacted law contained 14 of 15 farm bill titles. To resolve this issue, both the House and Senate passed a version of the 2008 farm bill with all 15 original bill titles (H.R. 6124). The President vetoed H.R. 6124 on June 18, 2008. That same day both the House (80-14) and the Senate (317-109) voted to override the veto and the bill became law (P.L. 110-246), replacing P.L. 110-234.

### **2.2.2 2014 Farm Bill Passage**

The full House considered the bill reported out of the Agriculture and Judiciary committees, HR 1947, but after amendment, the bill was defeated by a vote of 195-234. The full House then debated a variation of the defeated bill that dropped all of the nutrition title but included all of the earlier adopted floor amendments to the other titles. This revised bill (H.R. 2642) was approved by the House by a 216-208 vote on July 11.

On September 19, the House passed a stand-alone nutrition bill (H.R. 3102) by a vote of 217-210. The House adopted a resolution (H.Res. 361) on September 28 that combined the texts of H.R. 2642 and H.R. 3102 into one bill (H.R. 2642) for purposes of resolving differences with the Senate. A conference agreement reconciling the differences between the two measures was reported as the Agricultural Act of 2014 (H.Rept. 113-333) on January 27, 2014. Within eight days, both chambers approved the

conference agreement, the House on January 29 by a vote of 251-166 and the Senate on February 4 by a vote of 68-32. The President signed it into law (P.L. 113-79) on February 7, 2014.

### **2.2.3 2018 Farm Bill Passage**

The Agriculture Improvement Act of 2018 (P.L. 115-334), known as the “2018 farm bill,” was enacted on December 20, 2018, approximately eight months after the bill was introduced. In the House, the Agriculture Committee reported the bill on April 18, 2018, by a vote of 26- 20. An initial floor vote on May 18, 2018, failed in the House by a vote of 198-213, but floor procedures allowed that vote to be reconsidered (H.Res. 905). The House passed H.R. 2 in a second vote of 213-211 on June 21, 2018. In the Senate, the Agriculture Committee reported its bill (S. 3042) on June 13, 2018, by a vote of 20-1. The Senate passed its bill as an amendment to H.R. 2 by a vote of 86-11 on June 28, 2018. Conference proceedings to resolve the differences between the House- and Senate-passed versions of H.R. officially began on September 5, 2018 and concluded in December 2018 with Senate passage of H.R. 2 on a vote of 87-13 and House passage by a vote of 369-47 (H.Rept. 115-1072). The bill was signed into law on December 20, 2018 (CRS, 2019).

During the passage of the Farm Bill, a vote held to repeal the Energy Title was resoundingly defeated as 154 Republicans joined 186 Democrats to vote against the repeal (the Hill, 2018).



## 2.3 Funding for the Section 9003 Program Since 2002

Section 9003 has received mandatory funding since the 2008 Farm Bill. However, the Program's discretionary funding to provide grants to eligible projects has never been appropriated, and the program overall has experienced a constant reduction in funding since its inception. Regarding FY 2013: Congress did not complete action on any of the regular appropriations bills for FY 2013, relying instead on continuing resolutions.

### Funding for Farm Bill Title IX Energy Provisions, Section 9003 Program (in \$ millions by federal fiscal year)

#### 2002 Farm Bill - Biorefinery Development Program

	2002	2003	2004	2005	2006	2007	Total
Mandatory							
Discretionary (authorized)							~ No Funding Authorized or Appropriated ~
Discretionary (appropriated)							

#### 2008 Farm Bill - Biorefinery Assistance Program

	2008	2009	2010	2011	2012	Total
Mandatory	0	75	245	0	0	320
Discretionary (authorized)	0	150	150	150	150	600
Discretionary (appropriated)	0	0	0	0	0	0
<b>Total Authorized</b>						920
<b>Total Appropriated</b>						320

#### 2014 Farm Bill - Biorefinery, Renewable Chemical, and Biobased Product Manufacturing Assistance Program

	2014	2015	2016	2017	2018	Total
Mandatory	100	50	50	0	0	200
Discretionary (authorized)	75	75	75	75	75	375
Discretionary (appropriated)	0	0	0	0	0	0
<b>Total Authorized</b>						575
<b>Total Appropriated</b>						200

#### 2018 Farm Bill - Biorefinery, Renewable Chemical, and Biobased Product Manufacturing Assistance Program

	2019	2020	2021	2022	2023	Total
Mandatory	50	25	0	0	0	75
Discretionary (authorized)	75	75	75	75	75	375
Discretionary (appropriated)	0	0	0	0	0	0
<b>Total Authorized</b>						450
<b>Total Appropriated</b>						75

**Table 2-1** Funding for the Farm Bill Title IX Energy Provisions

## 2.4 Statutory Changes to the 9003 Program Since 2008

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The 9003 Program underwent significant changes under the 2014 Farm Bill and more amendments were made under the 2018 Farm Bill. The following section outlines those changes as described by the Federal Register in the public announcement of the 2015 interim rule and 2020 final rule to implement the program.

### **2.4.1 2014 Farm Bill Changes**

As defined by the Federal Register (2015).

- a. Revised the purpose and scope section by adding Renewable Chemicals and Biobased Product Manufacturing
  - i. Beneficiaries to the program now include owners and operators of Biorefineries whose primary product is a Renewable Chemical and owners and operators of Biobased Product Manufacturing facilities.
- b. Added the ability to fund Biobased Product Manufacturing facilities
  - i. the Agency would revise the rule to apply as broadly as possible to all types of projects eligible under the Program, such as changing references from “biorefinery” to “facility” and to identify in an annual notice the priority scoring criteria that explicitly apply to Biobased Product Manufacturing facilities.
- c. Removes the requirement that the majority of the Biorefinery production must be an Advanced Biofuel in order to be eligible for Program assistance
  - i. The Agency is removing the regulatory requirement that a Biorefinery primarily produce an Advanced Biofuel. In addition, the subsequent interim rule (this rule) requires that the Biorefinery produce at least some Advanced Biofuel, but it does not set a minimum production level of Advanced Biofuel, and does not require the Advanced Biofuel be sold as Biofuel. The primary effect of these changes is to allow a Biorefinery that primarily produces a Renewable Chemical to apply for a Section 9003 loan guarantee.
- d. Supplemented the Program to include a “project-finance framework,”
- e. Implemented a two-phase application process

- i. The most significant change in the rule that affects entities applying for this program is the implementation of the two-phase application process, which will have a positive impact on most applicants. Under the two-phase application process, all applicants must submit a Phase I application and then only a smaller subset of these applicants would submit the Phase II application.
- ii. The new application process reduces the cost to those applicants who are “unsuccessful”—that is, to those who are not invited to submit a Phase II application. This change reduces the impact of the Section 9003 program by almost 70 percent for the “unsuccessful” applicant. Thus, under the new application process, 67 percent of the applicants between fiscal years 2009 and 2014 would have incurred significantly lower application costs.
- f. Overhauled the scoring of applications to reflect a requirement of project diversity
  - i. the Agency would include the authority for the Administrator to award additional discretionary points in the priority scoring and selection process. As implemented, the Administrator, at the Administrator's discretion, may award up to 10 points to ensure as wide a range as possible of technologies, products, and approaches are assisted in the Program's portfolio.
- g. Limited Interest accrual to 90 days, in most instances, to determine what the guarantee will cover and what can be included in a loss claim

#### **2.4.2 2018 Farm Bill Changes**

As defined in the Federal Register (2020).

- h. Amended the definition of the term ‘biorefinery’: “a facility including equipment and processes that converts Renewable biomass or an intermediate ingredient or feedstock of Renewable biomass into any one or more, or a combination of biofuels, Renewable chemicals, or Biobased products and may produce electricity.
- i. Amended the definition of the term ‘eligible technology’:
  - i. (1) “A technology that is being adopted in a viable Commercial-scale operation of a Biorefinery that produces any one or more, or a combination, of an Advanced biofuel; a Renewable chemical; or a Biobased product; and

- ii. (2) a technology not described in item (1) that has been demonstrated to have technical and economic potential for commercial application in a biorefinery that produces any one or more, or a combination, of an Advanced biofuel, a Renewable chemical or a Biobased product.”
- j. Non-statutory change - a shift in timing for the requirement of the applicant to demonstrate 120 days of continuous, steady production from an integrated demonstration unit. Previously, this demonstration was required prior to loan closing. It will now be required prior to the issuance of a Conditional Commitment. The Rural Business-Cooperative Service believes this change will decrease the time between the issuance of a Conditional Commitment and loan closing and lessen the credit risk to the Government.

## 2.5 Federal Programs and Funds to Support the Bioeconomy

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A number of federal programs and funds exist to provide support to businesses operating in the bioeconomy. The below list is not meant to be comprehensive in nature, but instead provides an overview of some key programs at different levels of the bioeconomy including research and development, demonstration scale projects, commercial scale development, and other similar or related programs. The 9003 Program is listed under commercial scale development.

### **2.5.1 Research and Development Programs and Funds**

- a. Small Business Innovation Research Program (SBIR) and the Small Business Technology Transfer Program (STTR).

Both the SBIR and the STTR are administered by the Small Business Administration. The mission of the SBIR/STTR programs is to support scientific excellence and technological innovation through the investment of Federal research funds in critical American priorities to build a strong national economy (SBIR, 2022).

- b. USDA Agriculture Research Service (ARS) Office of Technology Transfer (OTT)

The Office of Technology Transfer (OTT) at the Agriculture Research Service (ARS) works with ARS scientists to ensure their research has the maximum impact on the U.S. agricultural community. OTT helps ARS scientists form research partnerships with university and industrial researchers, actively markets ARS technology, seeks intellectual property protection for ARS inventions when such protection will enhance technology transfer, and licenses ARS intellectual property to companies interested in commercialization (OTT, 2022).

- c. DOE National Laboratories and Technology Centers

DOE uses a suite of flexible tools to facilitate R&D partnerships that allow the National Laboratories to address a wide array of challenges. These tools include research centers, Innovation Hubs, research subcontracts, Cooperative Research Development Agreements (CRADAs), Strategic Partnership Projects (SPPs), and Agreements for Commercializing Technology (ACT). Research partnerships vary in size, scope, and duration. They range from a small group of investigators conducting discovery science to address specific technical questions to large research centers that bring together dozens of

experts from various disciplines and institutions to cooperatively address major research challenges (DOE, 2020).

d. Biomass Research and Development Board (BRD)

The Biomass Research and Development (BR&D) Board coordinates research and development activities concerning bio-based fuels, products, and power across federal agencies, and aims to maximize the benefits of federal programs and bring coherence to federal strategic planning (BR&D, 2022).

**2.5.2 Demonstration-Scale Projects (Pre-Commercial)**

e. Biomass Research and Development Board (BRD)

The BRD, mentioned above, can provide grant funds for demonstration-scale projects.

f. National Science Foundation’s I-Corps Program

The National Science Foundation’s Innovation Corps (I-Corps™) program uses experiential education to help researchers gain valuable insight into entrepreneurship, starting a business or industry requirements and challenges. I-Corps enables the transformation of invention to impact. The curriculum integrates scientific inquiry and industrial discovery in an inclusive, data-driven culture driven by rigor, relevance, and evidence. Through I-Corps training, researchers can reduce the time to translate a promising idea from the laboratory to the marketplace.

g. DOE Advanced Research Projects Agency – Energy (ARPA-E)

The Advanced Research Projects Agency-Energy (ARPA-E) advances high-potential, high-impact energy technologies that are too early for private-sector investment. ARPA-E awardees are unique because they are developing entirely new ways to generate, store, and use energy. ARPA-E empowers America's energy researchers with funding, technical assistance, and market readiness. The program includes a rigorous design, competitive project selection process, and active program management to ensure thoughtful expenditures (ARPA-E, 2022).

h. USDA ARS National Programs

ARS research is organized into National Programs. These programs serve to bring coordination, communication, and empowerment to approximately 690 research projects carried out by ARS. The National Programs focus on the relevance, impact, and quality of ARS research. The Bioenergy Research Unit (BER) conducts a broad-based program of microbial, biochemical, genetic, and

fermentation engineering research that is international in scope and importance addressing national research needs for new environmentally acceptable agricultural practices and value-added products. The overall mission of the BER research program is to develop bioproducts and bioprocesses for conversion of agricultural commodities into biofuels and chemicals, enzymes, and polymers.

### **2.5.3 Commercial Scale Development**

- i. USDA's 9003 Program - Biofuels, Renewable Chemical, and Biobased Product Manufacturing Assistance Program

- j. USDA's Renewable Energy for America Program (REAP)

REAP provides guaranteed loan financing and grant funding to agricultural producers and rural small businesses for renewable energy systems or to make energy efficiency improvements (REAP, 2022).

- k. USDA OneRD Loan Guarantee Initiative

This program offers loan guarantees to lenders for their loans to rural businesses, including for commercial purposes such as renewable energy programs or biofuel facilities.

- l. DOE Title 17 Renewable Energy and Energy Efficiency Program (REEE)

Through its Title 17 Innovative Energy Loan Guarantee Program, the Loans Program Office at DOE can help finance catalytic, replicable, and market-ready renewable energy and efficient energy technologies with \$4.5 billion of available loan guarantees. Loan guarantee eligible projects include biofuel and bio-refineries, as well as other renewable energy and efficient energy technology areas (REEE, 2020).

- m. Small Business Administration 7A Program

The 7A provides a maximum loan amount to small businesses of \$5 million. The program may provide funding for biofuel and renewable energy development businesses.

### **2.5.4 Other Similar or Related Programs**

- n. Biofuel Producer Program

Established through the CARES Act, this program authorizes the Secretary of Agriculture to make payments to U.S.-based producers of advanced, cellulosic, or conventional biofuel, biomass-based diesel, or renewable fuel to offset unexpected market losses as a result of the COVID-19 pandemic. \$700M in payments to eligible biofuel producers is available.

- o. Advanced Biofuel Payment Program

Producers will be paid on a quarterly basis for the actual quantity of eligible advanced biofuel produced during the quarter. For each producer, the Agency will convert the production into British Thermal Unit

(BTU) equivalent. The payment amount depends on the number of eligible producers, the amount of advanced biofuel produced and the amount of funds available during the fiscal year. There is no minimum or maximum payment (USDA, 2022)

p. BioPreferred Program

Managed by the U.S. Department of Agriculture (USDA), the goal of the BioPreferred Program is to increase the purchase and use of biobased products (USDA-BioPreferred, 2022). The BioPreferred Program was created by the 2002 Farm Bill and reauthorized and expanded as part of the Agriculture Improvement Act of 2018 (2018 Farm Bill). The Program's purpose is to spur economic development, create new jobs and provide new markets for farm commodities. The increased development, purchase, and use of biobased products reduces our nation's reliance on petroleum, increases the use of renewable agricultural resources, and contributes to reducing adverse environmental and health impacts. The two major parts of the Program are:

- a. mandatory purchasing requirements for federal agencies and their contractors;  
and,
- b. a voluntary labeling initiative for biobased products

q. DOE, Office of Energy Efficiency & Renewable Energy - Bioenergy Technology Office (BETO)

The U.S. Department of Energy's (DOE's) Bioenergy Technologies Office (BETO) develops industrially relevant, transformative, and revolutionary bioenergy technologies to enable sustainable, domestically produced biofuels, bioproducts, and biopower that can improve our energy security, reliability and resilience while creating economic opportunities across the country. BETO selects research and development projects through open and competitive procurements called Funding Opportunity Announcements (FOA) and encourages collaborative partnerships. BETO is partnering with USDA-NIFA to fund first-of-kind integrated biorefineries to reduce the technical and financial risks associated with the operation of commercial scale biorefineries. A map of biorefineries funded by BETO can be located at: <https://www.energy.gov/eere/bioenergy/integrated-biorefineries>



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### 3. Analysis of the Program to Date



## 3.1 Overview

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The analysis presented in this chapter is intended to provide a detailed overview of the program to date. Access to several USDA 9003 loan guarantee program databases was granted to conduct a review and analysis of the program, ranging from its beginning to date. Thorough examination of the various program elements and iterations to date as outlined below have been utilized in forming our key findings and recommendations for future program operations.

### **3.1.1 Data Analysis Background**

The first iteration of the Section 9003 Program was implemented under the 2002 Farm Bill in a collaboration between the USDA and the DOE. At this time, no mandatory funding was authorized for the program, in addition to no appropriation of discretionary funding (CRS, 2007). The first funding for the program would occur under the 2008 Farm Bill. Enaction of the 2008 bill would see USDA receive authority to issue grants and loan guarantees under the Biorefinery Assistance Program (BAP). In the 2008 Farm Bill, Congress ultimately appropriated funding for the loan guarantee portion of the program but refrained from providing discretionary funds for the grant portion.

The data available in conducting this chapter of the report spans the period of 2008 to 2022. During this timeframe, the Section 9003 program has evolved dramatically. The 2014 Farm Bill would introduce the two-phase application process that the program utilizes currently. This new process splits the application process into two “Phases”. Adoption of this format was intended to benefit applicants who prior to the two-phase system, would have incurred a significantly higher application cost. Phase 1 of the application process is intended to provide USDA with the information required to rank and prioritize applications based on eligibility and projects “economics and technical feasibility” (FY 2022 Biorefinery Application Guide, 2022).<sup>11</sup>

Information provided in Phase 1 is used to generate a USDA score which is used to prioritize projects. A “Borrower” score, which can be understood as a self-score, submitted typically by the applicant, lender or the feasibility study author is also provided (*pursuant to USDA on Borrower Score*). Applicants who qualify based on USDA review and ranking of their Phase 1 submission are invited to submit a Phase 2 application, during which applicants must demonstrate successful plant operations for 120 consecutive days (Biomass, 2020).

In addition to changes in the application process, numerous modifications to the program scope have significantly increased eligible projects. The 2014 Farm Bill included the addition of Renewable Chemicals and Biobased Product Manufacturing to acceptable production (Biomass, 2020)<sup>12</sup>. The 2018 Farm Bill would amend the definition of the term ‘biorefinery’ and approved technologies to include facilities, equipment, and processes which “converts renewable biomass or an intermediate ingredient or feedstock of renewable biomass into biofuels, and/or renewable chemicals, and/or biobased products. The facility may also produce electricity.”. Technologies of all types are required to be capable of consistent large-scale operation. (Biomass, 2020)<sup>13</sup>.

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<sup>11</sup> [https://www.rd.usda.gov/files/RBS\\_Section9003Biorefinery\\_ApplicationGuide.pdf](https://www.rd.usda.gov/files/RBS_Section9003Biorefinery_ApplicationGuide.pdf)

<sup>12</sup> <https://biomassmagazine.com/articles/17085/usda-publishes-final-rule-for-9003-loan-guarantee-program>

<sup>13</sup> <https://biomassmagazine.com/articles/17085/usda-publishes-final-rule-for-9003-loan-guarantee-program>

### **3.1.2 Data Analysis Methods: Database Overview**

All data were derived from the most recent database as of April 7, 2022 as provided by the 9003 Program Office at USDA. Several meetings were held between USDA staff and the Dynamic Sustainability Lab, and communication throughout the process provided guidance and relevant information as needed. Our primary analysis was conducted with N=69 applicants, with applications spanning from pre-2014 to 2022. Analysis was conducted across multiple metrics, highlighting differences in yearly applications amounts, state locale, loan request amounts, feedstock inputs, and final Bio-product classification among other variables.

*Note:* Phase 1 application data is not included in the main N=69, and the description of this portion of the analysis can be found in the disclaimer section below (3.1.4).

### **3.1.3 Data Analysis Methods: Units of Analysis**

The unit of analysis in this chapter are the applications collected and maintained in the main database by the USDA. Due to the variability in the 9003 program over the period of 2008-2022, a distinction throughout the analysis is made between the pre and post 2014 period. The introduction of the two phase process and changes within Farm Bill reauthorizations dramatically altered the incentive structures, application process, and qualifying project scope thus warranting a separate analysis to control for these differences.

The majority of applicant data available occur in the 2015-2022 period after the introduction of the two phase application process. Of the sixty-nine applications, 19% occur in the Pre-2014 period prior to the process, while 81% of analyzed applications were submitted in the 2015 to 2022 period.

### **3.1.4 Data Analysis Stratification**

During the primary analysis presented below, a number of categories and classifications are used to provide distinction between application process and status:

- **Active:** the active category outlines all applications that are currently actively navigating the application process (2015-2022 only)
- **Withdrawn/Expired Applications (WEA):** the “WEA” category outlines all applications that have withdrawn from or expired out of the application process.



- **Loan Closed/Obligated:** the “Loan Closed/Obligated” category outlines all applications that successfully achieved a conditional commitment with USDA and closed with their Lender of Record.
- **Aggregate:** the aggregate category outlines all applications regardless of their category (Ex. All 2015-2022 loans regardless of Active, WEA, or CC status.)

### **3.1.5 Data Analysis Disclaimers**

#### *Double-Counting*

All applications outlined in their data are as they currently exist in the database and double counting does not occur. Once an application progresses to the “Loan Closed/Obligated” status, is removed from the Phase 2 data section, and placed in the newly correspondent category. Similarly, if an application is withdrawn or expired, it was removed from the active category and placed into the WEA category. This categorization was already determined and completed by USDA prior to acquisition of the database, although some of the phrasing use here was in part developed by the lab.

#### *Phase 1 Analysis*

Throughout the research process, the research team was unable to locate an entirely comprehensive data set for all Phase 1 applications. As such, the confidence to extrapolate meaningful and accurate analysis is low. Analysis presented below is based on the limited scoring data available for analysis. Despite its limitations, it does provide a novel, if uncomprehensive look into the 9003 program scoring to date.

#### *Bio-Product Changes*

The very first iteration of the USDA 9003 program established in 2008 was intended to aid in the advancement of biorefineries that produced exclusively advanced biofuels (Biomass, 2020). Subsequent Farm Bill reauthorizations in 2014 and 2018 would see the 9003 program expand drastically, broadening definitions of qualifying technologies and biorefineries, and introducing the addition of renewable chemicals and the production of biobased products (Holland & Knight, 2018).

### **3.1.6 Reasons for Withdrawn/Expired Applications**

Throughout this chapter, the acronym “WEA”, or “Withdrawn/Expired Applications” will be used to describe a specific category of application. There are a variety of reasons applicants may withdraw or allow the application to expire. Several applicants cited the need to acquire greater funding to pursue the Integrated Demonstration Unit (IDU) required of Phase 2 in the 2014-2022 application period.

Applications may withdraw due to internal challenges where the organization changes the scope of their project or where modifications of their proposal require reevaluation of the program. Further applications have withdrawn to seek funding from alternative sources, while others simply cease communication with USDA. These types of applications are no longer considered active, nor to have successfully been obligated funds or closed on a loan agreement.

## **3.2 Pre-2014 Data Analysis**

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Data presented below represents the applications and projects prior to the introduction of the two-phase application process. Pre-2014 analysis has a total population of (N=13). The following distinctions will be made between the data in the Pre-2014 analysis.

### **3.2.2 Pre-2014 by Year**

The following Table 3-1 outlines the requested amounts of Pre-2014 applications by status. Specific yearly dates were not presently available for all applications and loans; as such, all data prior to 2014 are categorized under one yearly status. Specific years will be outlined in Table 3-3 below for the 2015-2022 data.

	<b>Pre-2014 (Aggregate)</b>		<b>Pre-2014 (WEA)</b>		<b>Pre-2014 (Loan Closed/Obligated)</b>	
Year	Records	Request Sum	Records	Request Sum	Records	Request Sum
Pre-2014	13	\$877,265,476	9	\$654,940,476	4	\$222,325,000

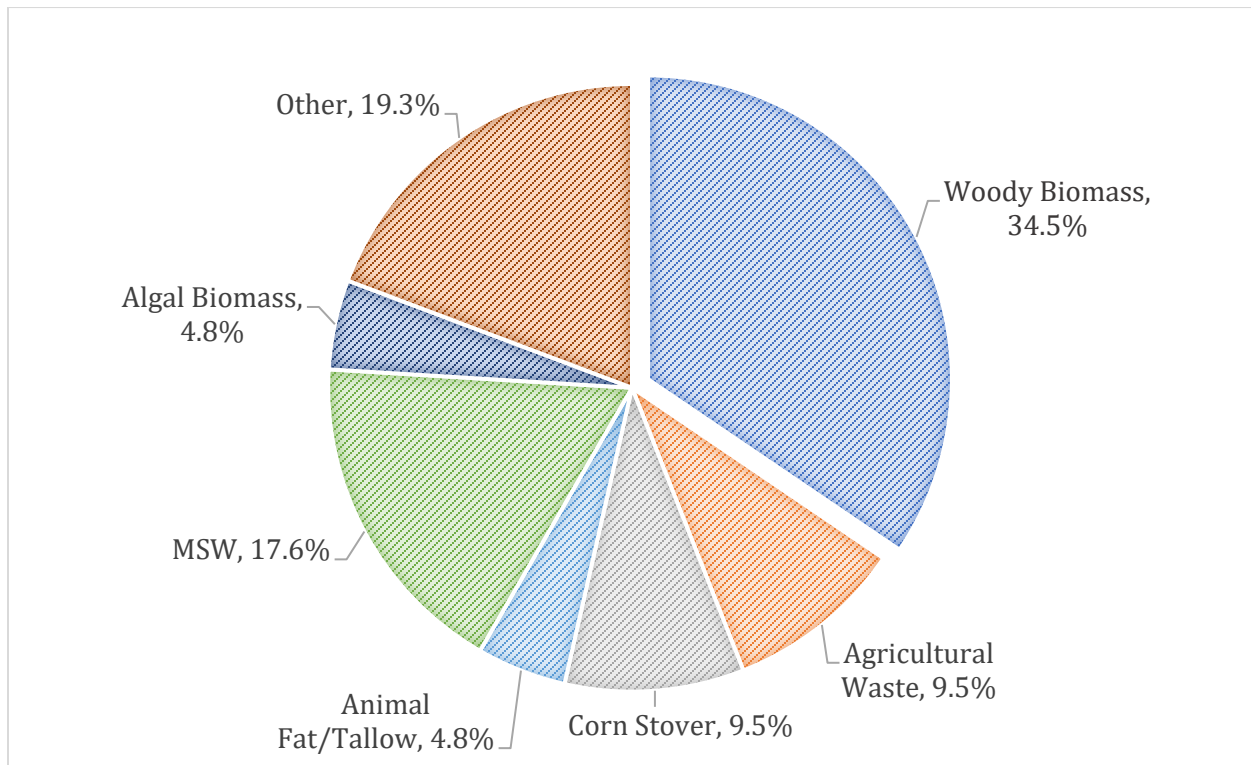
**Table 3-1** Pre-2014 Program by Loan Request/Loan Dollar Amount



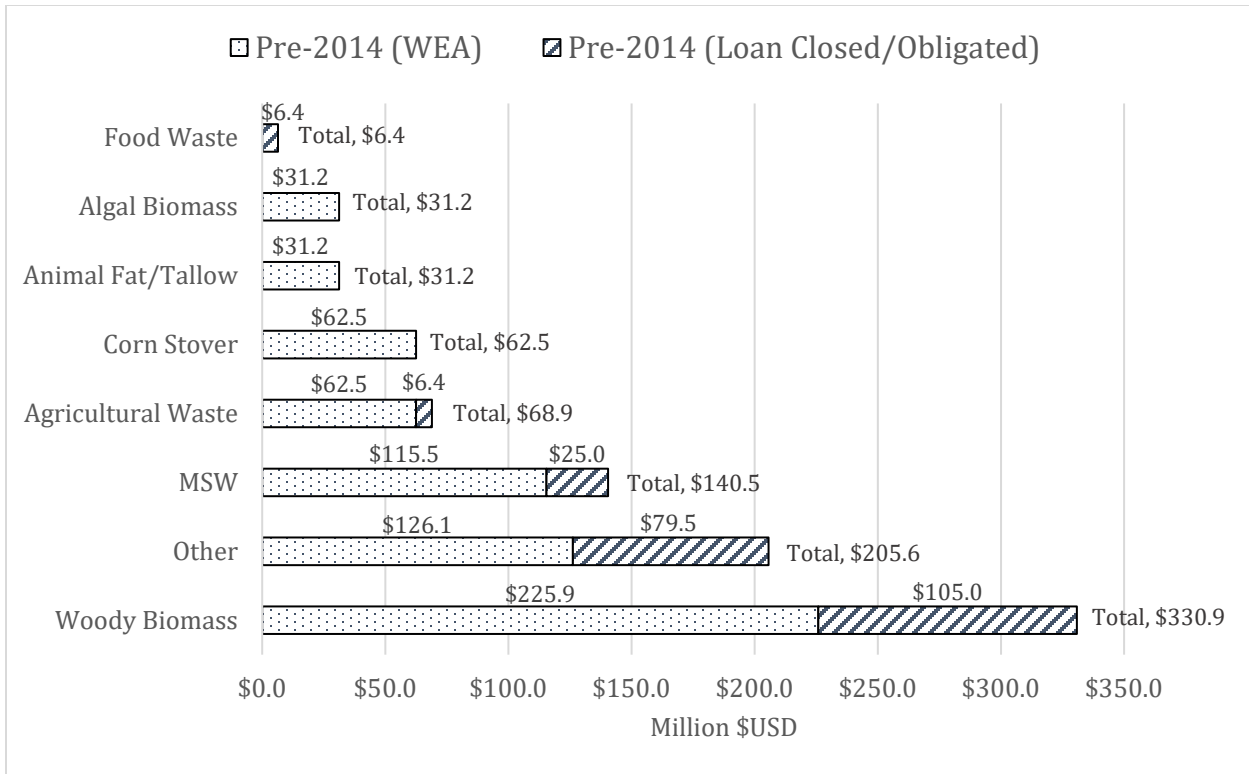
### 3.2.3 Pre-2014 by Feedstock

Prior to and after implementation of the two-phase application process in 2014, applicants provide information on the feedstocks they will use in production. The following section outlines the Pre-2014 WEA applications and Pre-2014 Closed/Obligated Loans by their feedstock inputs. In instances where multiple feedstocks were involved, amounts were assigned by distributing the total application loan request equally among the total number of unique feedstocks listed. Many feedstocks fell under one or more of the dominant categories outlined by the research team.

The “Other” category is used in instances where the feedstock did not warrant its own category and did not fit under the more general feedstocks outlined. Examples of “Other” category feedstocks include; Camelina, Railroad ties & Poles, Compostable packaging, Forest waste diverted from landfills, Miscanthus & Switchgrass, in addition to a number of other inputs.



**Figure 3-1** Pre-2014 (Aggregate) Feedstock by Percent of Loan Request/Award Dollar Amount

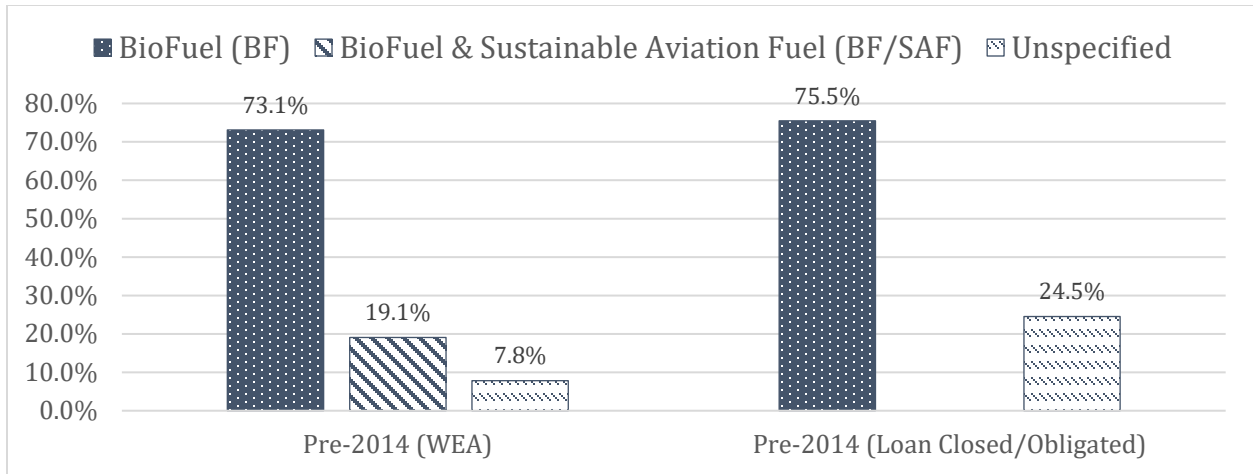


**Figure 3-2** Pre-2014 Loan Request/Award Dollar Amount by Feedstock & Status

Figure 3-1 highlights the aggregate Pre-2014 applications of which, “Woody Biomass” and “Other” comprised the largest percentage shares of application feedstock at 37.7% and 23.4% respectively (Figure 3.1.). Pre-2014 feedstocks are further outlined by the loan amount requested per application status in Figure 3-2. Woody biomass has been identified as an efficient bioenergy source, although it remains insufficiently cost competitive to produce compared to fossil fuels in most instances, and poses several considerations to scalability and productive capacity (White, 2010).

### **3.2.4 Pre-2014 by Primary Bio-Category Type**

The 9003 program is highly diverse in its applicants, and over 30+ unique BioFuels/BioProducts were identified throughout the total life of the program. To conduct a meaningful analysis, the data have been segmented into several general “Bio-Categories”. The following data outlines the primary Bio-Category type of each applications proposed final product. Each Pre-2014 application has been sorted into one of the following categories: Bio Fuels (BF), Bio Fuel & Sustainable Aviation Fuel (BF/SAF), or Unspecified.














**Figure 3-3** Pre-2014 Primary Product Category as Percent of Applicant Request Amount

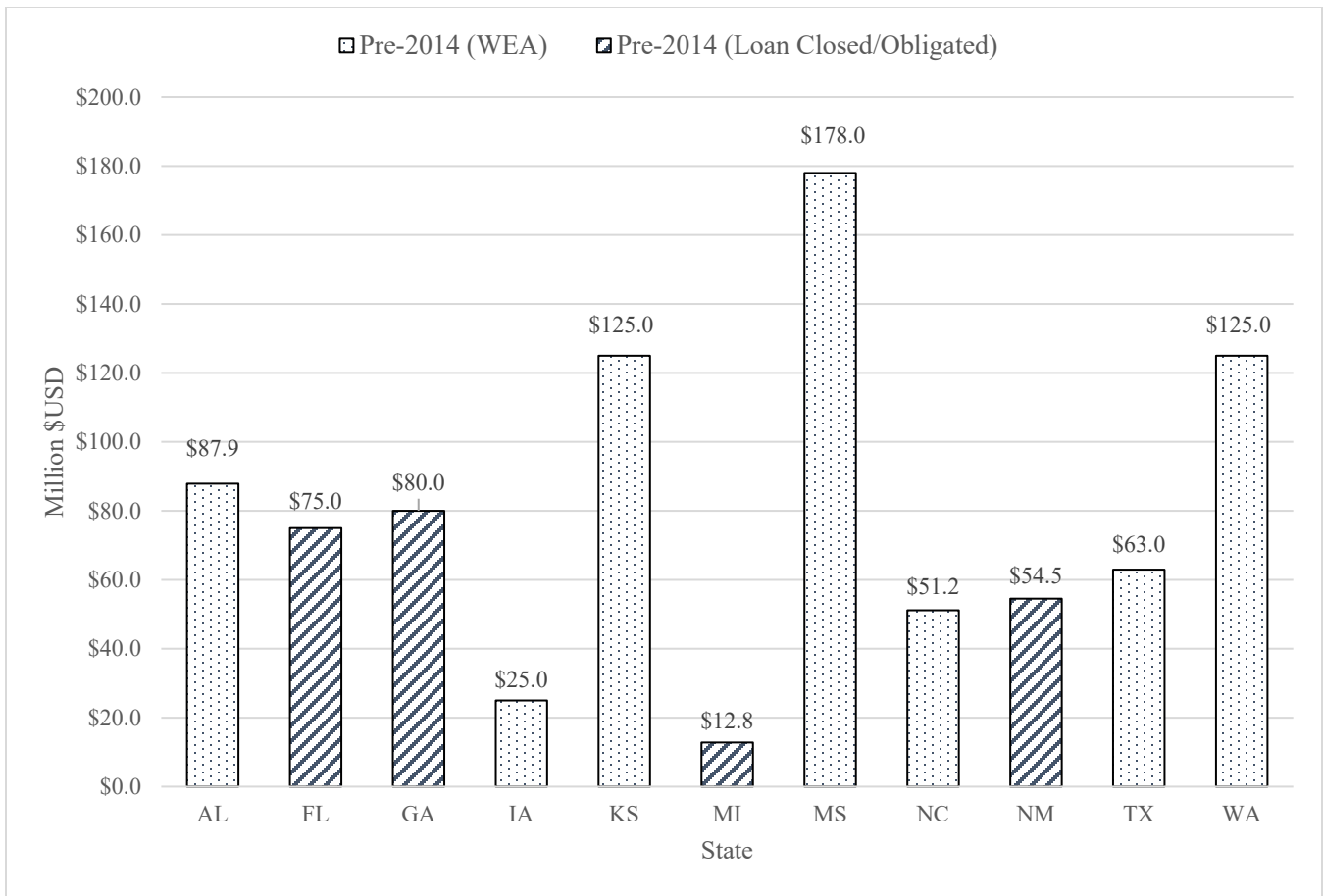
Due to the more restrictive nature of applications in the Pre-2014 period, it is perhaps unsurprising that the majority of applicants, 73.1% of WEA and 75.5% of closed/obligated fall within the BioFuels category. Additional categories are found in the 2015-2022 period with the aforementioned expansion of the program scope under the 2014 and 2018 Farm Bill Reauthorizations (Figure 3-9).

### 3.2.5 Pre-2014 Application by State

Loan requests amounts have varied significantly by state over the course of the 9003 program. Table 3-2 and Figure 3-4 outline the overall aggregate state loan request amounts in addition to stratifying by application status in the pre-2014 period.

Pre-2014 (Aggregate)			
State	Request Sum	Average Size of Loan Request	% Request Sum Total
 Mississippi	\$178,000,000	\$89,000,000	20.3%
 Washington	\$124,995,000	\$124,995,000	14.2%
 Kansas	\$124,995,000	\$124,995,000	14.2%
 Alabama	\$87,850,000	\$87,850,000	10.0%
 Georgia	\$80,000,000	\$80,000,000	9.1%
 Florida	\$75,000,000	\$75,000,000	8.5%
 Texas	\$62,950,000	\$62,950,000	7.2%
 New Mexico	\$54,500,000	\$54,500,000	6.2%
 North Carolina	\$51,150,476	\$25,575,238	5.8%
 Iowa	\$25,000,000	\$25,000,000	2.8%
 Missouri	\$12,825,000	\$12,825,000	1.5%

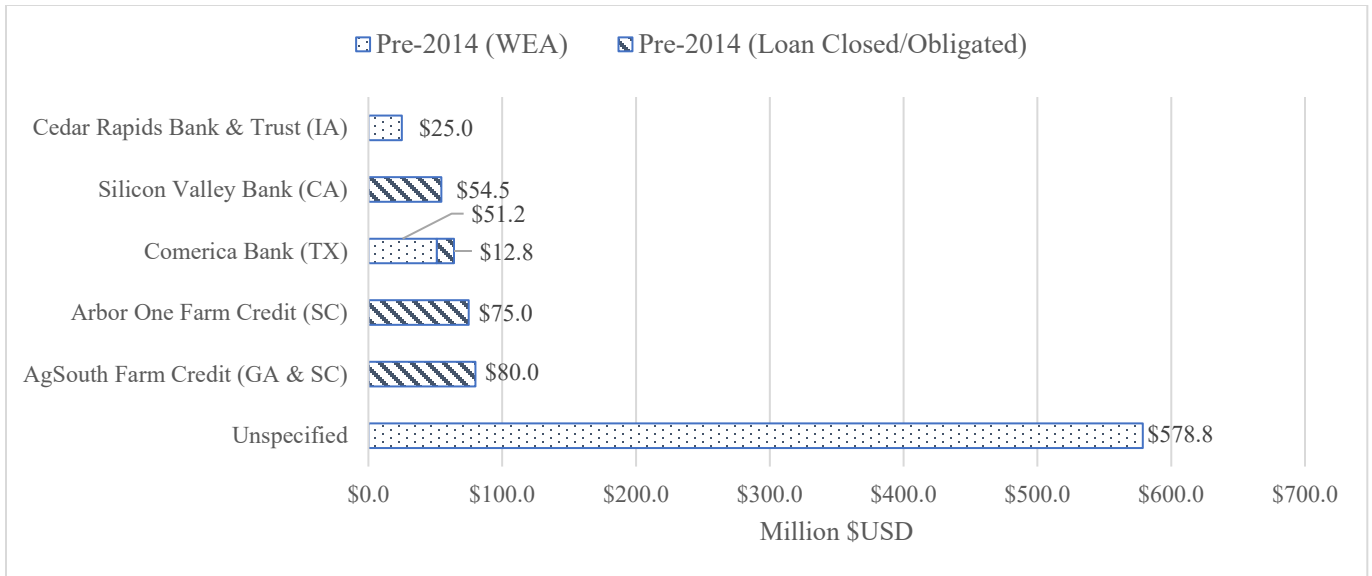
**Table 3-2** Pre-2014 Aggregate Loan Amount Request and Percentage by State



**Figure 3-4** Pre-2014 Loan Amount Request by State; Categorized by Application Status

### **3.2.6 Pre-2014 Application by Lender**

The lender is an integral part of the 9003 program application. The lender takes responsibility for administering and taking on the loan and is intimately involved in the application process. The lender also has the ability to remove sponsorship should the project change or fail to meet certain agreements.



**Figure 3-5** Pre-2014 Loan Amount Request based on Lender of Record, Including Unknown/Unspecified Lenders

A large portion of Pre-2014 applications did not have a specific lender listed in the available data. These applications, which make up the bulk of applications by dollar amount, are combined under the “Unspecified” category.

### 3.3 2015-2022: Phase 2 Data Analysis

Data presented below represent all applications beginning after the 2014 Farm Bill Authorization onwards, from the 2015 to 2022 period. All data described in this section have been subject to the two-Phase application process (N=56).

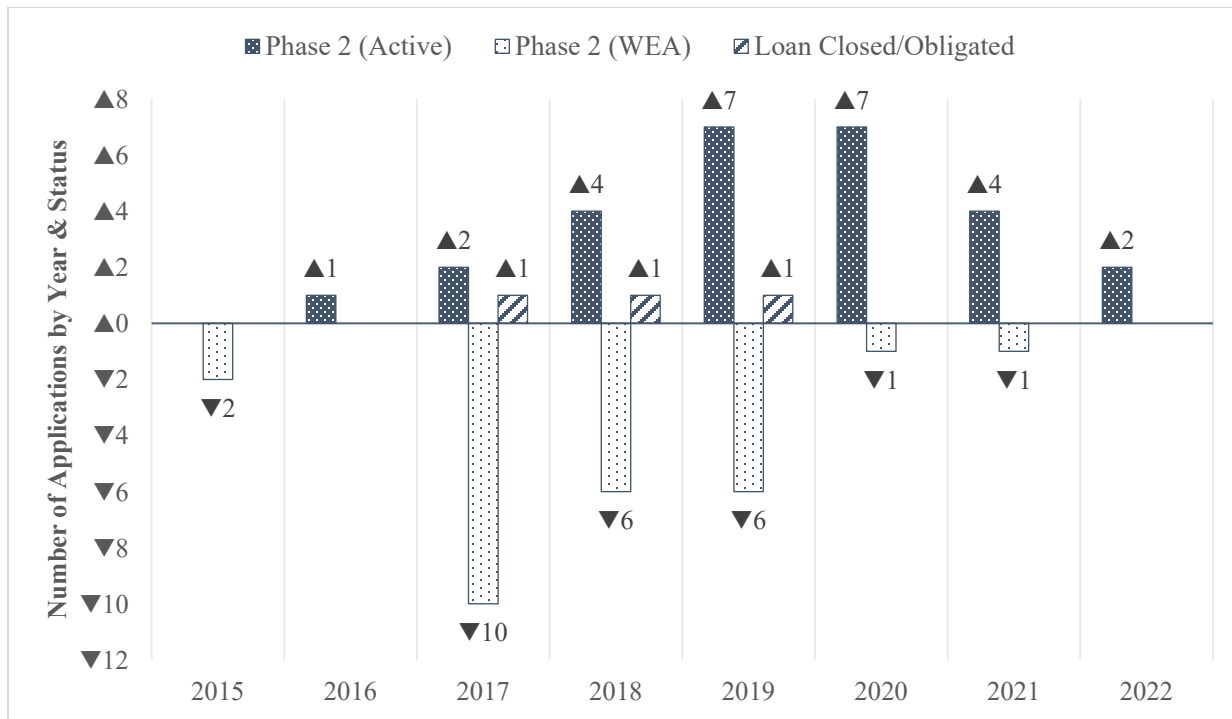
#### 3.3.1 Phase 2 by Year & Count

Available data from 2014 onward allows for analysis by year for Phase 2 data. Figure 3-6 below highlights each yearly addition to the corresponding Phase 2 application status. Data are available from 2015 to 2022. Yearly data for “Active” and “WEA” are derived from the available dates with which the application is understood to have been accepted into Phase 2. Loan Closed years are understood to be the year where conditional commitment and successful loan closure was achieved.

Year	Phase 2 (Active)		Phase 2 (WEA)		Loan Closed/Obligated	
	Records	Request Sum	Records	Request Sum	Records	Request Sum
2015	-	-	2	\$207,485,000	-	-
2016	1	\$125,000,000		-	-	-
2017	2	\$227,100,000	9	\$932,098,405	2	\$217,580,000
2018	4	\$343,250,000	6	\$585,652,358	1	\$198,000,000
2019	7	\$606,955,000	6	\$359,127,199	1	\$100,000,000
2020	7	\$530,429,854	1	\$136,000,000	-	-
2021	4	\$438,686,322	1	\$250,000,000	-	-
2022	2	\$360,095,696	-	-	-	-
Total	27	\$2,631,516,872	25	\$2,470,362,962	4	\$515,580,000

**Table 3-3** 2015-2022 Phase 2 Loan Request/Loan Dollar Amount

Figure 3-7 outlines the number of applicants that entered into their Phase 2 or conditional commitment phase, and what their current status within the database is presently. For example, there are two applicants that originated in 2015 that subsequently entered into WEA status. We cannot speak to the year they switched into this status but can highlight that it has occurred.



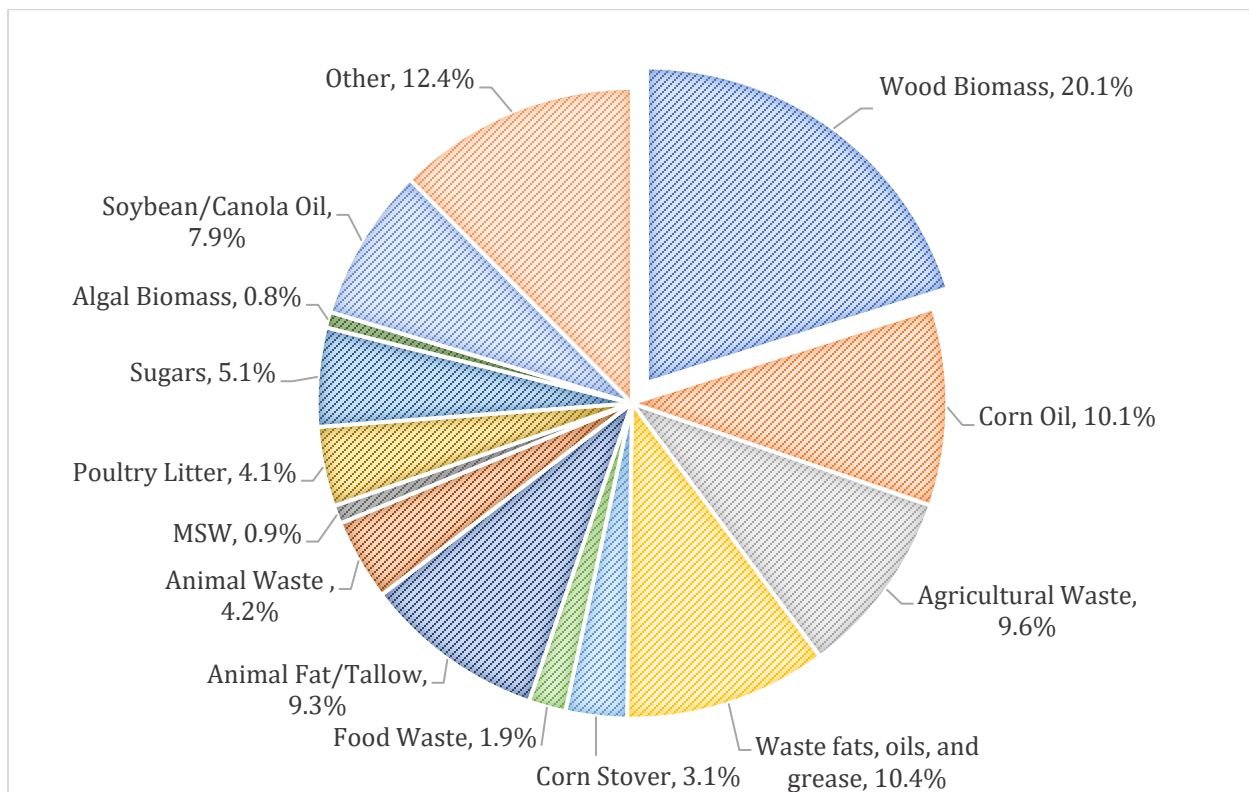
**Figure 3-6** 2015-2022 Phase 2 Present Composition of Applications by Phase 2 Acceptance Year or CC Year

From Figure 3-6, we can see that from 2015 onward, Phase 2 active applications increased steadily through 2020, with fourteen additional applications between 2019 and 2020, before dropping slightly in 2021 and 2022. Between 2015 and 2021, twenty-five applications withdrew or expired from the program, with the twenty-one drops (84%) occurring in the period of 2017 to 2019. Of Phase 2 period applications, four have successfully received Conditional Commitments with the USDA, with all falling between 2017 and 2019.



### 3.3.2 2015 to 2022 by Feedstock

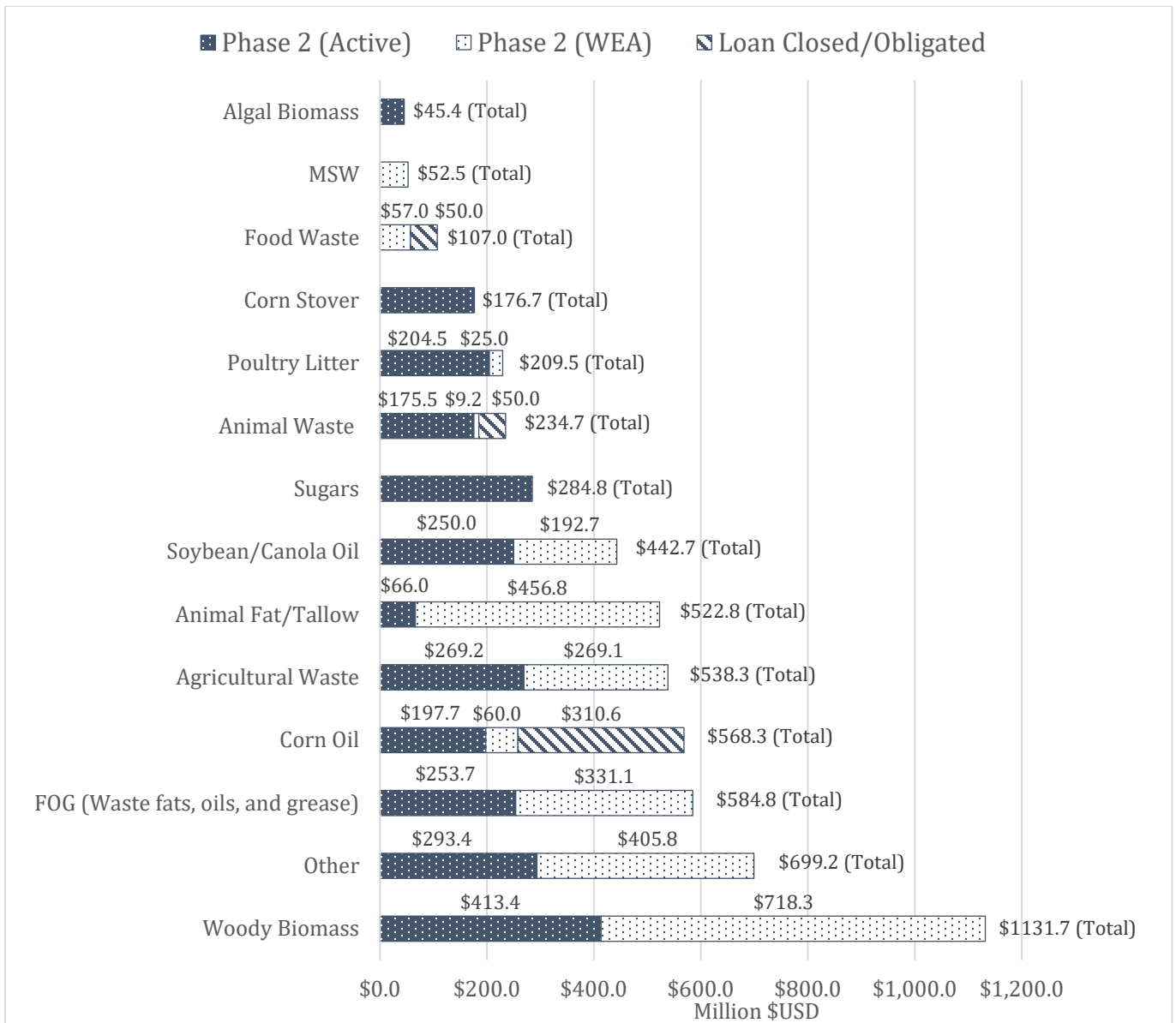
The Two-Phase application process continues to collect data on feedstocks used for production. The following section outlines the 2015-2022 Phase 2 applications by their feedstocks. It may be noted that a greater number of feedstocks exist in the Phase 2 application process, likely attributed to the greater project scope under the 2014 and 2018 Farm Bill iterations.



**Figure 3-7** 2015-2022 (Aggregate) Feedstock by Percent of Loan Request/Award Dollar Amount

Figure 3-8 outlines feedstocks by their dollar amount requested/awarded and the status of the application in the USDA database.

Similar to Pre-2014, in instances where multiple feedstocks were involved, amounts were calculated by distributing the total application loan amount equally among the total number of unique feedstocks listed. Many feedstocks fell under one or more of the dominant categories outlined by the research team. The “Other” category is used in instances where the feedstock did not warrant its own category and did not fit under the more general feedstocks.



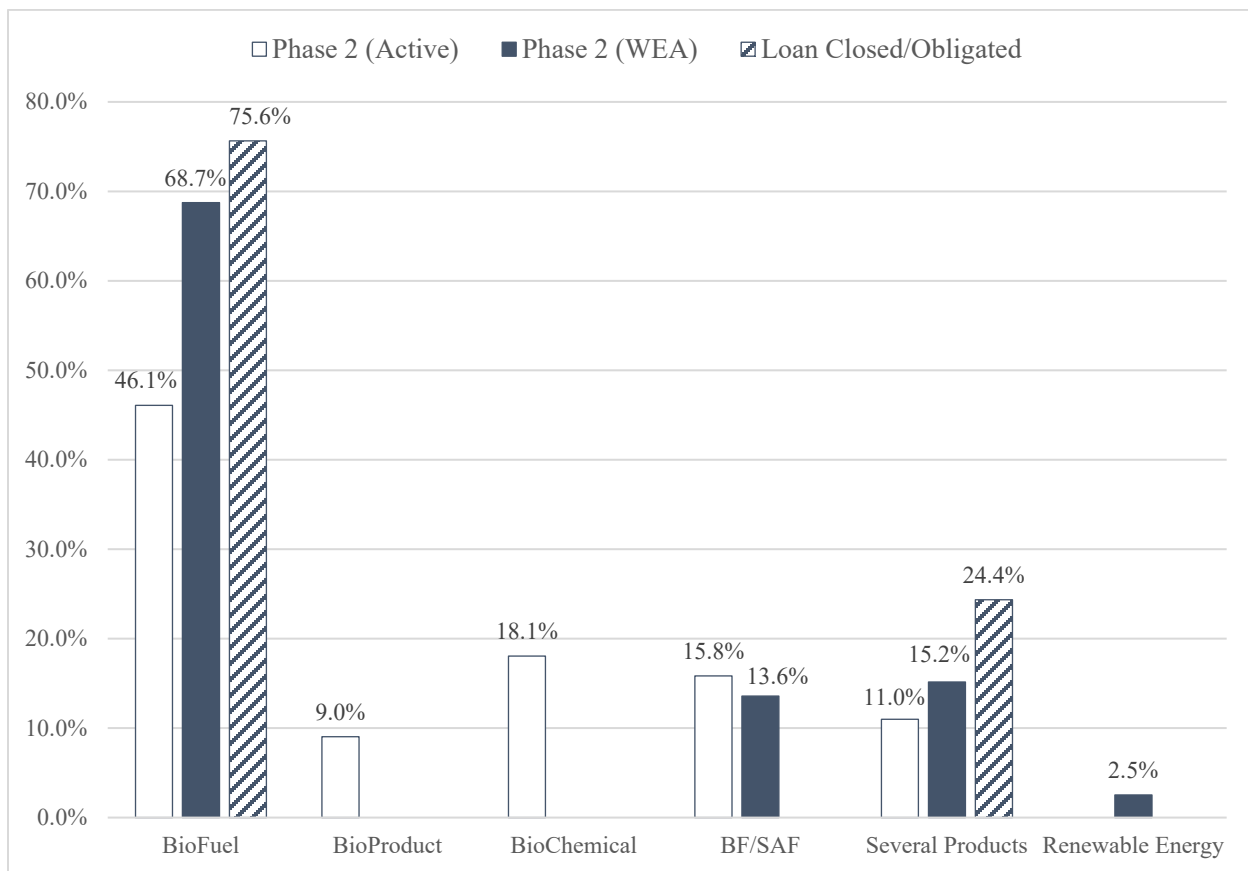
**Figure 3-8** 2015-2022 Loan Request/Award Dollar Amount by Feedstock and Status

Both “Woody Biomass” and “Other” feedstocks remain the highest categories at 20.1% and 12.4% respectively compared to the pre-2014 application data, although their respective percentages are lower than the pre-2014 application period in Figure 3.1, noting as before the numerous additional categories. In 2015-2022, “Corn Oil”, “Agricultural Waste”, “FOG”, and “Animal Fat/Tallow” play a much larger role at around 10% of application requests each (Figure 3-7).

Despite remaining the highest category, unlike Pre-2014 where 50% of closed/obligated loans were fully or partially comprised of “Woody Biomass”, none of the 2015-2022 conditional commitments fell under this category.

### 3.3.3 Phase 2 by Primary Bio-Category Type

Expansion under the 2014 and 2018 Farm Bills is likely attributed to the increased number of Bio-Categories as outlined in the Phase 2 data relative to the Pre-2014 applications (Figure 3-6) Each Phase 2 application was sorted into one of the following categories: Bio Fuels (BF), BioProduct (BP), BioChemical (BC), Bio Fuel/Sustainable Aviation Fuel (BF/SAF), Several Products, and Unspecified.













**Figure 3-9** 2015-2022 Primary Product Bio-Category as Percent of Applicant Request Amount

The data in Figure 3-9 highlights that while there has been significant expansion of acceptable projects under the new USDA guidelines, BioFuels remain the single largest category of applicants by a large margin, followed by the “Several Products” category. Such findings may suggest that opportunities exist to expand awareness of the program to industry actors who specialize in non-BioFuel production.

### 3.3.4 Phase 2 Application by State

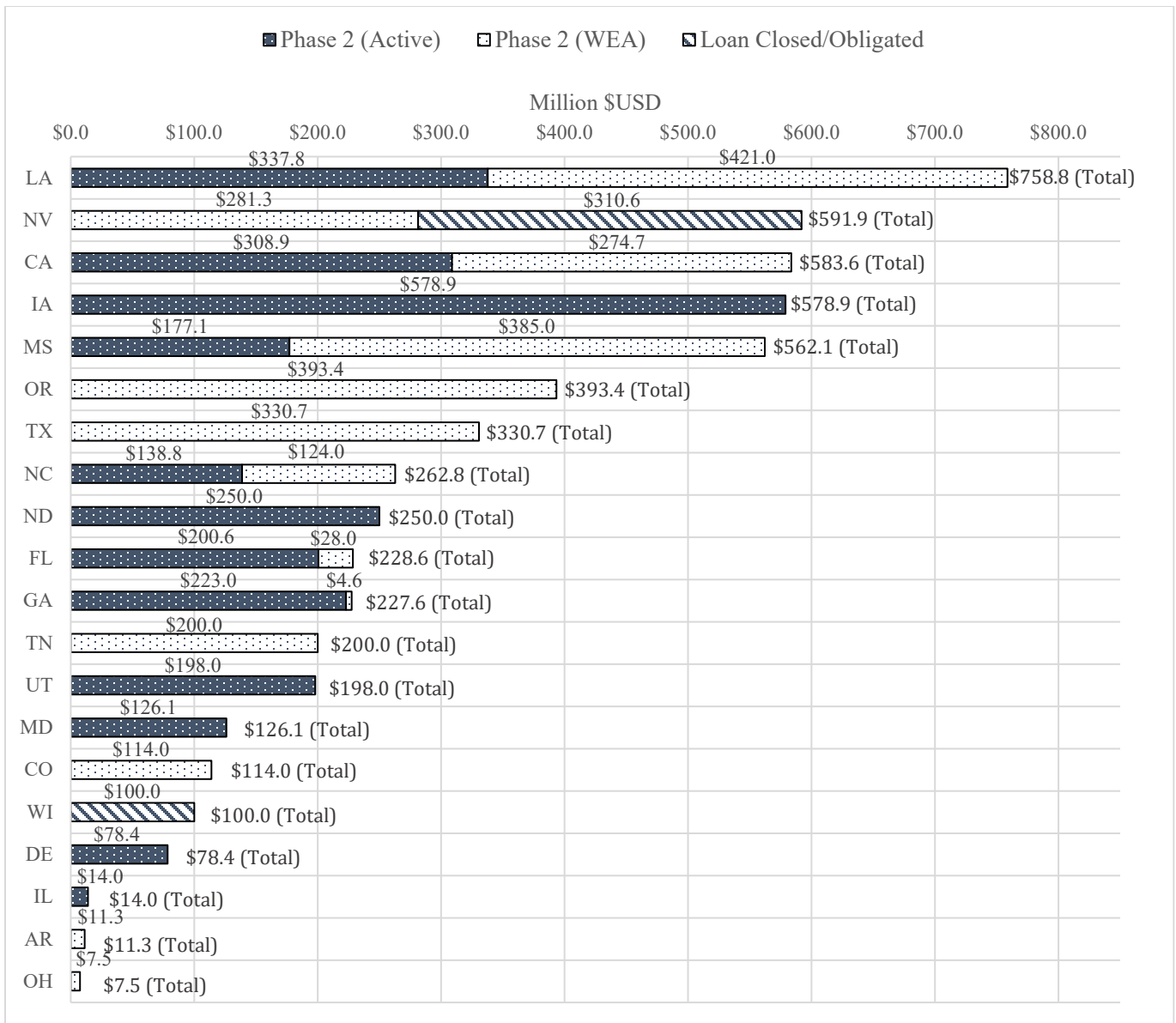
As previously outlined, applicants have ranged widely across the country. When looking at the life of the program from its inception in 2008 to the present 2022, at least one application has originated from 25 of the 50 United States. Some states have seen multiple applications over time, with states like California and Louisiana seeing applicants submit 10 and 6 applications, (17.9% and 10.7%), of 2015-2022 applications respectively. (Figure X.X). Table 3-4 outlines aggregate the State specific data for 2015-2022.

2015-2022 (Program Aggregate)					
State	Request Sum	Average	Request Sum (%)	Application Count	Application Count (%)
 Louisiana	\$758,750,000	\$126,458,333	13.5%	6	10.7%
 Nevada	\$591,919,000	\$147,979,750	10.5%	4	7.1%
 California	\$583,573,959	\$58,357,396	10.4%	10	17.9%
 Iowa	\$578,936,322	\$144,734,081	10.3%	4	7.1%
 Mississippi	\$562,099,996	\$140,524,999	10.0%	4	7.1%
 Oregon	\$393,400,000	\$131,133,333	7.0%	3	5.4%
 Texas	\$330,652,358	\$165,326,179	5.9%	2	3.6%
 North Carolina	\$262,775,000	\$87,591,667	4.7%	3	5.4%
 North Dakota	\$250,000,000	\$250,000,000	4.5%	1	1.8%
 Florida	\$228,570,000	\$57,142,500	4.1%	4	7.1%

 Georgia	\$227,564,000	\$45,512,800	4.1%	5	8.9%
 Tennessee	\$199,999,000	\$199,999,000	3.6%	1	1.8%
 Utah	\$198,000,000	\$198,000,000	3.5%	1	1.8%
 Maryland	\$126,065,000	\$63,032,500	2.2%	2	3.6%
 Colorado	\$113,974,199	\$113,974,199	2.0%	1	1.8%
 Wisconsin	\$100,000,000	\$100,000,000	1.8%	1	1.8%
 Delaware	\$78,445,000	\$78,445,000	1.4%	1	1.8%
 Illinois	\$14,000,000	\$14,000,000	0.2%	1	1.8%
 Arkansas	\$11,250,000	\$11,250,000	0.2%	1	1.8%
 Ohio	\$7,486,000	\$7,486,000	0.1%	1	1.8%

**Table 3-4** 2015-2022 Aggregate Loan Request/Award Dollar Amount by State

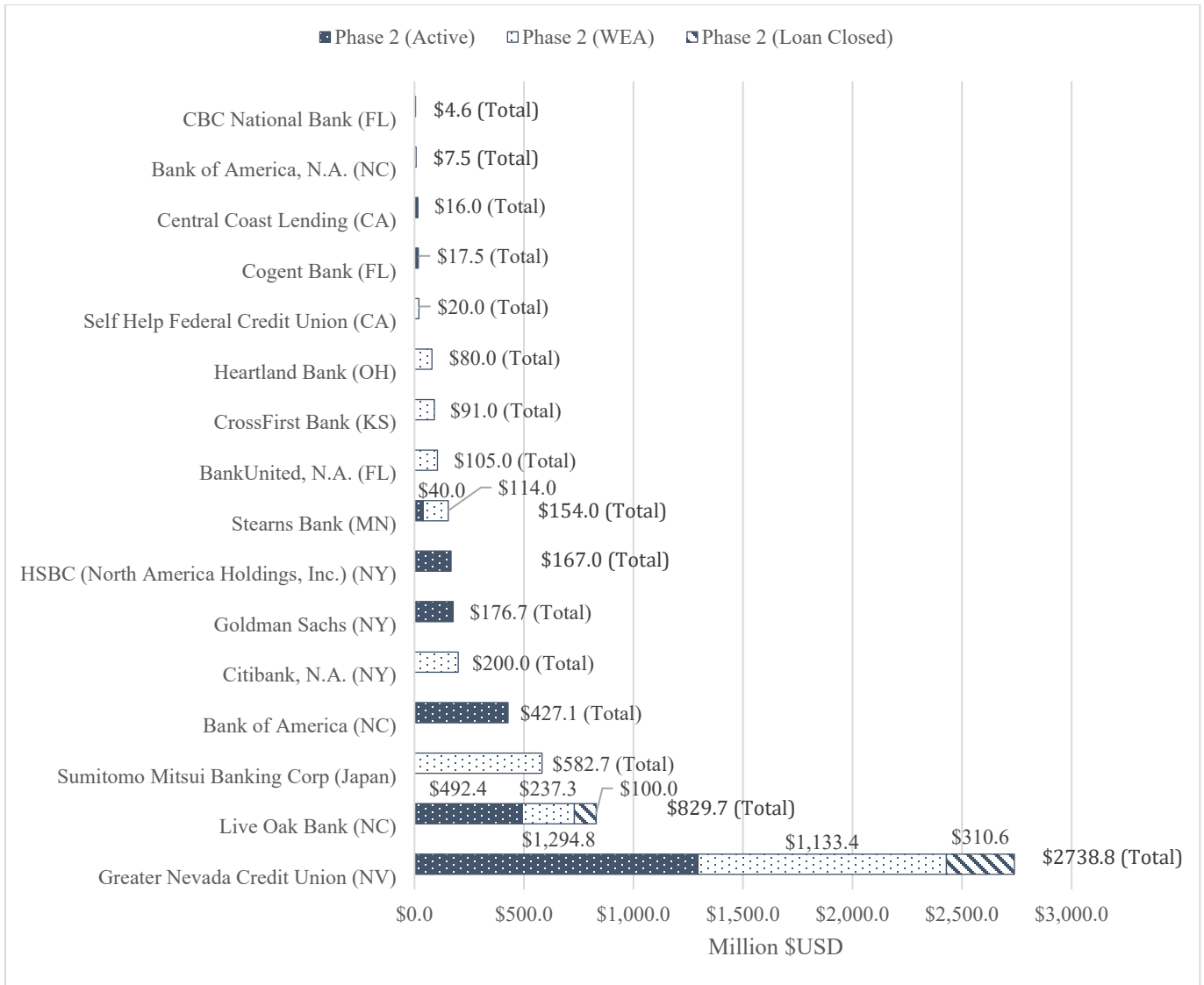
Applications in the 2015-2022 period experienced a significant shift on a statewide basis. The top three states by application amount in this period saw no submissions in the Pre-2014 period. California, a state which had no applications in the Pre-2014 iteration, now has the highest count of applications with 10 submissions, and the third highest amount in terms of aggregate requests at 10.4%. In terms of overall application requests, Louisiana has the highest aggregate request amount at 13.5% and 10.7% of applications by count. Nevada with 7.1% of application count slightly tops California at 10.5% of aggregate request amount. Figure 3-10 outlines the statewide data by the loan status.



**Figure 3-10** 2015-2022 Loan Request/Award Dollar Amount by State & Status

### 3.3.5 Phase 2 Application by Lender

As mentioned previously, Post-2014 began the period of two-Phase applications, and the majority of applications, 81%, analyzed from 2008 to 2022 have occurred during this time. 2015-2022 saw a much higher number of application in addition to greater diversity in lender support as outlined in Figure 3-11 below.



**Figure 3-11** 2015-2022 Loan Amount Request based on Lender of Record

The data above highlights the loan request amount by lender of record and application status. From this, a handful of lenders reveal themselves as the largest sponsors of applications across the program. “Greater Nevada Credit Union” and “Live Oak Bank” have sponsored by far the largest number of applicants over the course of the Post-2014 period, in both dollar amount and application count.

## **3.4 USDA & Lender Phase 1 Scoring**

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The following section outlines the Phase 1 data available after the initiation of the 2014 two-phase application process. Although a fully comprehensive dataset of Phase 1 scores was unable to be acquired, the following section highlights what Phase 1 data is available with a number of disclaimers outlined below. In Phase 1, applicants are scored to determine eligibility for project advancement into Phase 2 of the application cycle.

Advancement to Phase 2 is predicated on projects obtaining a sufficient score from both the “Lender” and USDA. A USDA score of 55 is typically the lowest score that is acceptable for movement into Phase 2. Some exceptions to the 55 and up scoring have occurred under certain circumstances, although these instances appear quite limited based on the data in possession. The “Borrower” score can be understood as a self-score, submitted typically by the applicant, lender or the feasibility study author.

### **3.4.1 Phase 1 Scoring Disclaimer & Process**

During the review process, it was not possible to locate a fully comprehensive dataset for Phase 1 applications. For several applications, scores were simply unavailable after inquiry and with USDA assistance. To this end, we are unable to ascertain whether all Phase 1 applicants were known to the team, even those with no scores on file. Despite this limitation, we believe analysis of even a limited series of Phase 1 data provides some insight into program.

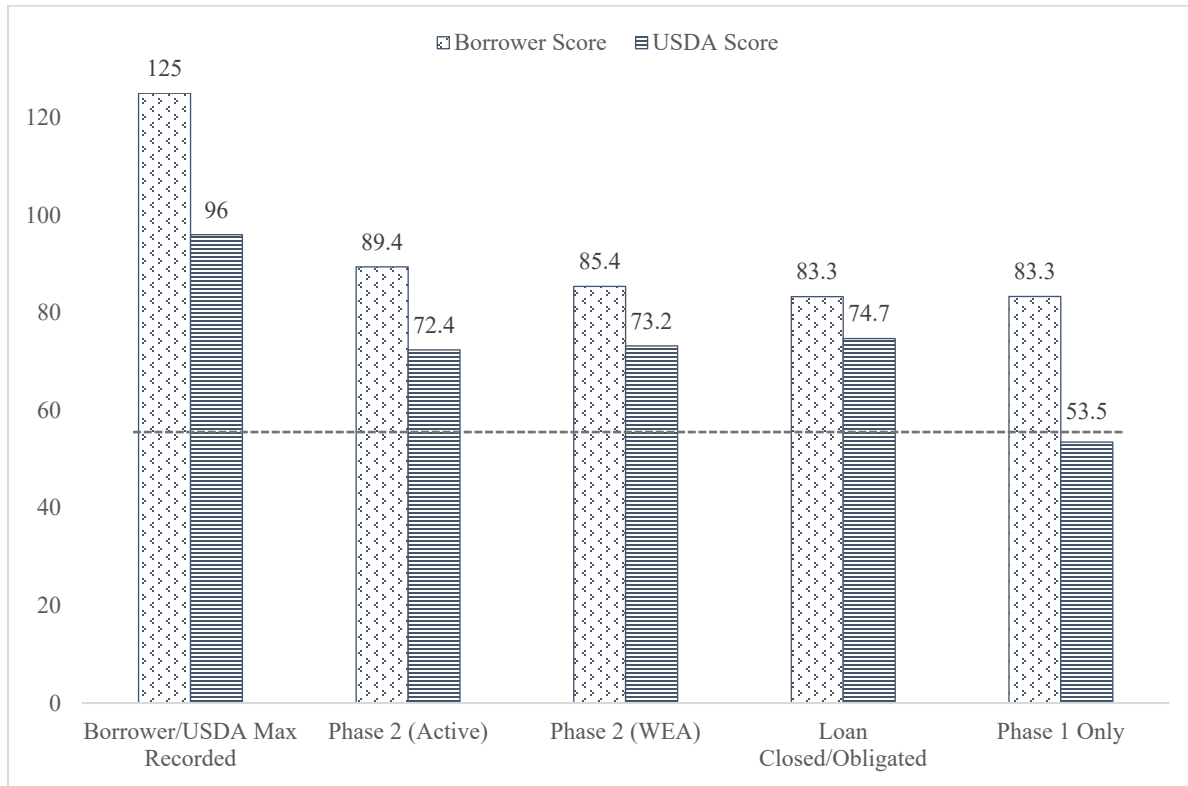
There are two main features of note when calculating Phase 1 data. Firstly, is when the Borrower or USDA score on file was listed as a “0”. In such instances, these zero values were included in calculations. Secondly were applications that exist on file but one or both of their scores was unavailable. In this instance, the unavailable data was effectively considered blank, and did not affect the given calculations, as assigning a zero value may be inaccurate. After adjustments, the final dataset contained N=59 Borrower scores and N=58 USDA scores.

### **3.4.2 Phase 1 Data by Scorer & Status**

Figure 3.13 outlines the average Phase 1 score based on current project status. The dotted line at 55 points indicates the cutoff score under which projects are not accepted unless special consideration is given in limited circumstances.



The “Phase 1 Only” category in Figure 3-12 indicates loans that applied to Phase 1 without any recorded progression into Phase 2 of the application process.



**Figure 3-12 2015-2022: Phase 1 Average Application Score by Application Status**

*Note; Pursuant to USDA on “Borrower Score”*

In each status category the average overall self-assessed Borrower score was higher than the corresponding USDA score. In the Phase 1 Only category, there is a 29.8 point, or 35.7% difference between the average scores.

It is also of note when comparing average Borrower and USDA scores to one another across application status. Looking across Phase 2 (Active), Phase 2 (WEA), and Loan Closed/Obligated applications, there is less than a 7% variability between their average Borrower and USDA scores in each instance (89.4 to 83.3 to 85.4 & 72.4 to 75.5 to 73.0).

Out of all applications with a Phase 1 score, the maximum Borrower score in the given dataset was a 125, while the maximum USDA score lies at 96.

### **3.5 USDA Closed/Obligated Loans**

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From the period of 2008 to 2022, there have been seven applications that have made it to what this review refers to as the “Loan Closed/Obligated” portion of the 9003 loan guarantee. Loan closed/obligated here is defined as loans that in the pre-2014 period were obligated funding and closed loans after OMB review. In the 2015-2022 period, these applications successfully navigated through Phase 1 and 2 of the application process before receiving OMB approval for loan guarantee obligation and closure with their lender of record. Through review of the program from 2008 to 2022, a total of seven projects identified successfully made it to the Conditional Commitment/Loan Closed portion of the program. Of these seven, the pre-2014 period saw three applicants while the remaining four occurred in the 2015-2022 timeframe. A number of disclaimers must be noted regarding closed loans.

#### **3.5.1 Loan Closed/Obligated Disclaimers**

Information regarding the status of certain projects that advanced into the Loan Closed/Obligated stage is at times not entirely clear in the data available for this report. Readers should note that a projects’ attainment of this status in the context of our report occurs once funds have been officially obligated to the applicant.

Prior to this section, analysis has not been conducted based on obligated amounts. Previous graphs and tables in this chapter have outlined the requested loan amounts, and not the awarded amounts unless otherwise specified. This section continues to utilize the initial loan amount requested as the numerical unit of analysis.

The Loan Closed/Obligation status additionally cannot be used to infer the long-term success of the awarded project. The data regarding the outcome of obligated and closed loans is in some instances ambiguous, and suggests that projects have experienced challenges including; adjustment to technologies post-award, missed loan payments, and facility liquidation or closure. Sections 3.5.3 and 3.5.4 highlights each of the closed/obligated projects as the currently stand.

### **3.5.2 Pre-2014 Loan Closed/Obligated Projects:**

The following projects reflect the four applicants who received a loan closure prior to the 2014 Farm Bill Reauthorization.

INEOS – 2010: INEOS accepted and signed their loan closing documents on 8/12/2011. As of December 2016, INEOS did not restart their plant operations. Available data is unclear as to how long, at what capacity, and if INEOS facilities were in operation prior to its decommissioning of the biorefinery. USDA data indicates that the lender moved into liquidation and the loan was repurchased by the Agency for \$52,237,334. USD.

Fremont Community Digester – 2010: Fremont Community Digester accepted and signed their loan closing documents 1/28/2011. USDA data outlines a dispute between Fremont and the project's general contractor over approximately \$3 million dollars of change orders and cost overruns that Fremont claims they did not approve. The project was ultimately liquidated with a remaining loan principal balance of \$4.1 million. It is unclear from the data if this amount was repaid.

Sapphire Energy – 2009: Sapphire Energy's exact loan close sign date is unavailable in the current data. On 4/5/13, the borrower retired the loan and the accepted loan guarantee was paid in full. The actual production is listed as "pending" in the database, and exact production status and operation timeframe is unclear.

Range Fuels Soperton Plant, LLC – 2008: Range Fuels Soperton was issued a Loan Note Guarantee at 80% of \$80 million dollars on 2/10/2010 that was accepted and closed. In 2011, the company failed to pay on the principal and interest of their Regional Food System Partnership bonds and the business was closed. In 2012, the plant and assets were liquidated and sold to LanzaTech, Inc. The total losses to USDA amounted to \$33,228,919.

### **3.5.3 2015-2022 Loan Closed/Obligated Projects:**

BC Organics: BC Organics' exact loan close sign date is not listed in the current data, and it is the most recent project we understand to have been obligated funding. The project had advanced to Phase 2 in 4/1/2019. Under their BAP Portfolio Status, the project is listed as "Loan Closed". Updated data will ideally confirm this analysis.

Ryze Renewables Reno, LLC-2016: Ryze Renewables Reno, LLC accepted their obligated loans in December 2017. The project missed several months of loan repayments and the loan appears to have gone into default at some point. The project appears to have shifted its lender of record from Jefferson to Greater Nevada Credit Union. The project is listed as continuing construction after changing lenders.

Ryze Renewables Las Vegas, LLC-2017: Ryze Renewables Las Vegas accepted their obligated loans and signed closing documents on 6/25/2018. The applicant proposed a change in their conversion technology provider and submitted a change order request to USDA. A period of forbearance was achieved between the borrower, lender, and agency and extended until July 2022. Other alternative funding sources are being sought by the borrower.

### **3.5.4 Closed/Obligated Loan Proposed Production Capacity:**

The following table outlines the proposed production capacity of the prior section’s applications:

<b>Biorefineries - NOFA</b>	<b>CC Status</b>	<b>BioFuel/BioProduct</b>	<b>Capacity</b>	<b>Actual Production</b>
BC Organics	Project Approved	Renewable natural gas, nutrient stream, and clean water	2 million gallons	N/A
Ryze Renewables Reno, LLC – 2 016	Loan Closed	Renewable Diesel, Naphtha, Propane	40.8 million gallons	N/A
Ryze Renewables Las Vegas, LLC - 2017	Loan Closed	Renewable Diesel, Naphtha, Propane	100 million gallons	N/A
INEOS - 2010	Liquidated/Loss	Cellulosic ethanol	8 MMGY ethanol; 6 MW electricity; 393 Wet Tons Per Day	N/A
Fremont Community Digester - 2010	Liquidated/Loss	Biogas from food processing waste	2.85 MW; 300TPD food and solid waste	N/A
Sapphire Energy - 2009	Loan Closed	N/A	N/A	Pending
Range Fuels Soperton Plant, LLC - 2008	Liquidated/Loss	thermo-chemical cellulosic ethanol	20 million gallons of ethanol and methanol.	N/A

**Table 3-5** Proposed Productive Capacity by Obligated and Loan Closed Status

Based on Table 3.5 and the descriptions in section 3.5.4, there has been limited production output over the course of the program. Sapphire Energy-2009 appears to be the only applicant who can be tentatively confirmed as having begun production. The exact amount of time, their actual as opposed to proposed output, and their current facility status are unknown from the data.

Additionally, given the current database setup, it was not fully possible to confidently identify the timeframe between entering Phase 1, Phase 2, and a loan closed offer and acceptance. Greater clarity and consistent record keeping between phases and monitoring of post loan closure is highly recommended for future projects. It is possible that some of this data exists but was not in possession.

### **3.6 Concluding Thoughts**

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The data analysis conducted in this chapter is intended to provide interested parties with relevant information with which to better understand the core components of 9003 applications from the program's inception in 2008 to present day. Additional points of analysis can certainly be found within the data provided by USDA, but the intention here is to provide both a working and nuanced overview of the program. Throughout the analysis there are numerous data sections such as the classification of applications by "Bio-Category" that were undertaken by the lab to make data more workable. Such classifications did not originate explicitly from USDA.

Additional note should be taken that the analysis here has been conducted to the best understanding of the research team given in certain instances incomplete data. Future inclusion of missing variables may alter the results presented here. Ideally, specific stakeholders and personnel will be able to utilize the data presented here most relevant to their organizations and to further the initiatives of the USDA in developing sustainable, economically viable, and ecologically sound futures.

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## 4. Perspectives By Stakeholders



## 4.1 Perspectives By Stakeholders

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The project team undertook a number of interviews<sup>14</sup> with a broad segment of business sectors and government organizations associated with the 9003 program including biochemical and biobased product companies, lenders and the financial sector, attorneys representing those in the biobased economy, biobased related industry associations, independent engineers engaged in technical reviews, current and former government agency personnel as well as academic researchers.

In general, those interviewed have been consistent in their view that the USDA has done a good job of developing guidelines for environmental assessment, feasibility, and the application process. However, overwhelmingly there is a general view that the 9003 program has not been as successful in generating new biobased manufacturing infrastructure and companies. As one interviewee stated, *“The USDA is motivated to get as many applicants in the door as possible – their goal is of course to demonstrate viability of the program. However, the challenge is their lack of success in funding viable projects.”* One leading lender stated, *“The program could fund well over a billion dollars a year in the bioeconomy – we in the financial community could really use this program-but they need to re-think their approach. There is lots of potential because of the amount of deal flow in the biorefinery and bioeconomy sector.”*

From a generalized financing lens most of those interviewed offered a similar view as expressed by one interviewee who stated, *“For many companies, raising equity is the biggest challenge. A start-up needs to raise about 25% of the project costs in equity to pay the feeds. So, a \$200M project will need to raise \$40-50M in equity. For new technologies this can be a challenge. New technologies in this area cannot be seen as an “easy money” opportunity to make a fortune!”*

Almost all interviewed believed that we are at an inflection point that provides unprecedented opportunities and need for a 9003 program that can be more effective in providing loan guarantees that result in new and successful biobased/sustainable chemical and product manufacturing capacity and

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<sup>14</sup> All interviews were conducted under an Institutional Review Board (IRB) process (22-059) authorized through the Office of Research Integrity and Protection at Syracuse University. The interviewees names and organizations are kept confidential.



American jobs. Most pinpointed that the changes necessary to further advance the success of the 9003 program needs to be driven by the most senior leadership at USDA as presented in Chapter 5 of this report. Additionally, three generalized opinions were consistent by those interviewed.

**First**, those interviewed applauded the leadership in USDA ORD in undertaking this review and for their sense of urgency to meet the growing demands by industry. **Second** and related, USDA needs to be much more responsive to industry suggestions to streamline the process and to address barriers that have not been addressed up to this point in time. **Finally**, most of those interviewed indicated that many of the problems in “customer service” is as a result in the understaffing in the 9003 Program office and high personnel turn-over in the program.

## **4.2 Perceived Technology Challenges by Stakeholders**

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### **4.2.1 Innovative Technology**

Many of the stakeholders interviewed expressed strong concern in regard to how the 9003 program interprets innovative technology. The overall impression is that the program office takes a position that is too restrictive and not consistent with other agency loan guarantee programs. The US DOE Title 17 program was repeatedly pointed out as a more appropriate and pragmatic approach. Specifically, the Department of Energy LPO defines innovative technology as a technology not deployed more than three times at commercial scale in the United States and needs to avoid, reduce or sequester greenhouse gas emissions. Those interviewed strongly encouraged the 9003 office to take an approach more consistent with other agencies-specifically DOE LPO Title 17.

Similarly, there is a perceived challenge regarding the interpretation of what is meant by a “new technology”. The statutory language did not specifically say the technology had to be completely novel, although priority is given to those projects which are truly novel, as opposed to those using existing technology but in a new and innovative manner. This is an important factor in developing the scoring criteria on deciding on the best projects to represent the program (Phase 1).

### **4.2.2 Technology Section 7**

Section 7 of the application focuses on equipment installation. It requires having people to review the description of startup and shakedown specification processes for each piece of equipment and the facility as a whole. According to stakeholders, this is an almost impossible requirement to complete before the construction is complete. Many believe this is not the appropriate time in the application process to provide details on how to schedule major installations, start-up, and specification. Experts we interviewed recommend that almost 80% of section 7 could be removed. This section should instead focus on applicants explaining what will be done moving forward and not a premature requirement.

### **4.2.3 Technology Section 9**

Section 9 – Decommissioning process –requires identification of any issues, costs, etc. for removal of the facility. This was deemed unreasonable by our experts. An applicant should consider the decommissioning during the design process, but it is unlikely an applicant will have it figured out at time of application. Instead, the stakeholder believe it would be better to explain the methodology to be

considered when decommissioning is required but to understand as technologies change, so do decommissioning approaches.

#### **4.2.4 Operations and maintenance part B**

This section involves the mechanical schedule for piping, controls, and mechanical piping, as well as the schedules that go into that (e.g. regeneration of catalysts). Stakeholders interviewed believe that this is not the right time for these details. Instead, they believe it would make sense to outline the routine operations and maintenance schedule for the facility, the financial model, and major maintenance budgets lined up around the maintenance schedule. It is unlikely that the maintenance for piping and similar items can be forecasted at this time, as it depends on what type of gas is going through it and other factors that cannot be predicted at the time of the application process.

### 4.3 Integrated Demonstration Unit (IDU)

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The integrated demonstration unit (IDU) has been deemed one of the most significant hurdles mentioned by interviewed experts, which many believe has prevented the 9003 program from becoming more successful, and has also detracted from the appeal to venture capitalists. The integrated demonstration unit must be able to run for 120 consecutive days, and that is often viewed as not commercially reasonable.

*“Technical issues will inevitably come up, which will require recalibration and shutting down of the equipment, which means it must start all over again”.* The lending and legal community believe that a condition precedent was written so that individuals could not even apply if they did not have demonstration units when they came in the door. They must demonstrate the 120 days before the loan guarantee will be put into place. The new rule effective October 1, 2020 is that the integrated demonstration unit would be up and running and produce 120 days of data before the USDA will grant a conditional commitment. *“In effect the USDA is trying to limit conditions and narrow the time frame to get a better chance of closing. This is not a DOE Title 17 requirement.”*

Another lender noted that “the ‘valley of death’ for the 9003 program is the requirement for an integrated demonstration unit (IDU) to be operational for 120 days of consecutive run time. This was not originally a requirement for the program. “The 120 day consecutive days requirement is infeasible; it is unlikely that there isn’t even a small problem which requires a small repair or maintenance issue.

As a result, “obtaining money to fund an IDU is ‘damn near impossible’, and is one reason why many VC’s steer clear of the program.”

## 4.4 Perceived Financing Challenges by Stakeholders

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Lenders we interviewed were very positive about the need for the 9003 program. However, most were disappointed that the 9003 program *“has only closed 5 loans in the last 15 years and the volume of deal flows in the biorefinery and bioeconomy sector is not what it should be for the program.”*

*“It seems to attract interesting project applicants from a marketing and branding perspective, and there are a lot of Phase 1 front-end applications that are considered, with many of the projects being innovative and having a high potential to make a meaningful impact in the bioeconomy. However, not many have made it through.”*

There is uniformed belief by the financial community across the country that a higher success rate is important to make a difference in view of the program within the financial community. Developers have a belief correct or incorrect that the 9003-application process is, ‘scary, time-consuming, and costly’ resulting in many potential applicants *“deciding that they do not want to go through the application process as a result”*.

### 4.4.1 Review Approach

According to various lenders, *“DOE has stated the following: If applicant coming to federal government, underwrite as if it is a bank. But if providing a **loan guarantee** to a bank or commercial lender then trust in their credit process and due diligence.”*

*“However, what is frustrating to the lending community is that the USDA does not take this approach – they seem to want to underwrite as if a bank. The private sector spends months on due diligence of these projects – why does USDA then have to collaborate with other agencies etc. and go through the same process? Especially pertinent to the technical review.”*

### 4.4.2 Interference by Technical Reviewers

There appears to be a belief and general consensus from those interviewed that individuals brought in by the 9003 program on the technical review are inserting themselves into the financing aspects of the review process which results in both delays and potentially inappropriate requests from the applicants.

### **4.4.3 Cash on Hand**

As later discussed in the marketing of the program section, some stakeholders believe there needs to be greater awareness by applicants that the program requires a 25% cash contribution (cash on hand or investments) to apply, which is a requirement for OMB subsidy scoring. T

Cash may be sought from a new market tax credit, C-Pace, or through independent venture capitalists.

*“Of course, VC money has become more difficult in the last two years, as the rate of return from biobased investments may pale compared to the typical quick return on software projects in Silicon Valley! And many applicants are scientists who have no idea on how to identify sources of seed funding.”*

### **4.4.4 Small vs. Large Applications**

Multiple lenders and attorneys noted that *“the Phase 1 and Phase 2 process works well; where the process falters is when the smaller loan applications “soak up” the time spent in the process.”* For example, *“a borrower or lender seeking \$50M in credit will not wait 2+ years for the 9003 process to play out.”*

There was strong consensus that the 9003 program implement at tiered application and review process for applications \$50M or less and for applications greater than \$50M. The office working with industry input could construct a modified application process for the smaller applications where there is lower risks and because a borrower or lender seeking \$50M in credit which is considered small, will not wait 2-years for the 9003 application process to play out.

### **4.4.5 Application & Application Deadlines**

Currently the 9003 program has a two-step process. The first step to apply is for the applicant (lender or the borrower) to submit to the Agency a Letter of Intent to apply for a loan guarantee. The Agency must receive the Letter of Intent at least 30 calendar days prior to the application deadline. The applicant then must submit a complete Phase I application which allows the 9003 program office to determine lender, borrower, and project eligibility; preliminary economic and technical feasibility; and the priority score of the application.

Based on the priority score ranking, the Agency will invite applicants whose Phase 1 application receive higher priority scores to proceed to Phase 2 of the process which will include the environmental report, technical report, financial model, and the applicant's credit evaluation. The Phase 2 materials are submitted as the ongoing project develops and the planning and engineering is finalized.

The USDA has established two separate application deadlines. The first is by 4:30 p.m. Eastern Daylight Time (EDT) on October 1 and the second is at the same time on April 1 of each year.

There was general consensus of those interviewed that the USDA should do away with only having two application dates and open up the application process to accept applications year-round. *“Having only two application dates adds unnecessary delays in the 9003 application process which itself is already too long a process. These technologies being developed are competing with technologies by companies in other countries who have an advantage to be first to market due to the time required for the 9003 program.”*

#### **4.4.6 Debt Coverage Ratio**

A final recommendation is a perceived lack of a capital cost requirement in the application guidelines. *“Nowhere does it ask what the plant is going to cost, and this is important for the bank to understand the debt coverage ratio.”* In many cases, the cost estimates are however vastly underestimated. This is important to develop the “worst case” scenario – and adding a 150% Contingency capital cost estimate can be an important “realistic” factor. Past projects have often seen capital costs double on these new projects. *“If a 25% contingency cost (at minimum) is added, it can be put into a “lock box” and you may not need it. But it may be important if capital cost overruns occur, and that money may be definitely needed in such cases.”*

#### **4.4.7 Perceived Vagueness and Transparency**

Those interviewed were concerned that the credit rating is too subjective, demonstrating a lot of variability between cases. The technical review is also “subjective and opaque”; a good model is the NEPA process review which is more transparent and descriptive.

#### **4.4.8 Bundling**

Some of those interviewed believe that the 9003 program should follow the lead of US DOE which allows multiple sites under the same borrower to be put forward as a single facility plan rather than make each a separate application.

#### **4.4.9 OMB Delays**

The 9003 program requires having to go to the OMB for subsidy costs, whereas REAP and BIN do not have to go through this process, which some stated can add up to at least 60 days and one interviewee stated almost a year to the project. If the OMB identifies an issue, that can add additional “significant delays” in the process.

#### **4.4.10 Financial Models**

The 9003 loan guarantee program started with Moody’s as a financial model however the program moved away from that and now every project needs to have its own model. As such 9003 does not have a programmatic financial model anymore results in a project-to-project examination which further adds to the administrative burden.

### **4.5 Awareness and Marketing of the Program**

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One of the most repeated comments by those interviewed was that the general public remains largely unaware of the 9003 program including the benefits of the program to grow the biobased economy and jobs in rural areas of the United States. There was greater emphasis on this point as more and more companies and industrial sectors around the world are committing to a net-zero carbon economy.

Further, most pointed to the aggressive marketing across the country by the US Department of Energy Loan Programs Office (LPO). Most pointed to the appointment of a Director of the LPO (Jigar Shah) who is a highly energized, industry respected and aggressive advocate for the LPO. Further, the LPO has a robust and consistently updated website and a very strong social media effort which those interviewed pointed out as a deficit and opportunity for the USDA 9003 program.



## 4.6 Strengths of the 9003 Program

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The most vocalized strength of the program from those representing industry is that the 9003 program is needed and that a well-managed 9003 program that is successful in distributing loan guarantees is a cornerstone for the United States to be competitive with China and the European Union in meeting an increasing demand for renewable and low-carbon biobased solutions.

While those interviewed articulated opportunities to grow a more successful 9003 program, most were consistent in their opinion that the USDA 9003 staff have been very responsive to inquiries by prospective applicants and do a very good job in being available and for coordinating on-going meetings. Many expressed that the 9003 program office does a very good job, better than most other agencies in communication. *“Weekly calls once there is a green light is very helpful and we almost always have a collaborative relationship with the office”* stated an individual from the private sector with extensive interactions with the office. Most noted a similar sentiment as that provided which said, *“that the 9003 office should be given a pat on the back as they appear to be significantly understaffed as compared to US DOE.”*

Many interviewees also made a point about the rigor of the 9003 program and argued that many of the complaints made by applicants would apply to any independent private sector entity making the same type of investments.

*“The people who complain about having to run an IDU for 120 days haven’t seen what it takes to make a big plant work in the private sector. If a major energy company is going to invest in a commercial plant, they will want to see one or two years of operational data. They understand the importance of figuring out the risks before the investment, and how to mitigate risk with someone else’s money. Banks don’t have a horse in the race, because the loan is guaranteed, and they mitigate their risks. So that is why so much due diligence is required before the USDA can guarantee these investments.”*

Many of our interviewees pointed to the fact that the 120-day requirement is reasonable. A lot of work was done by the DOE and the USDA around evaluating the technical gaps associated with technologies that didn’t work. Advocates insist that the 120-day test does not mean that a failure will shut it down. However, the primary test is that the process much be integrated. Integrated implies a functioning unit:

the feedstock that is proposed must be shown to be actually fed into the IDU in its actual state, and the finished product must be shown to come out the other end. Pilot programs often test only one part of the technology in a simulated lab setting – integrated means the unit must be demonstrated to function as stated. *“It has to function over 120 days – and it is acceptable to interrupt it for calibration and maintenance during that period – but it must function properly.”*

Given these requirements, there are a lot of reasons why projects cannot meet this requirement – and much of it is related to the depth of experience and knowledge of the individual entrepreneurs running the project. A default position is to blame the USDA for not funding more projects – but the criteria, which have been passed by Congress – must be met to succeed. As one expert who has worked with a lot of clients seeking funding notes:

*“There are a lot of limitations on the applicant side – where people simply aren’t able to get things done. The USDA is open to everyone, and indeed, the USDA encourages everyone to apply. For that reason, a lot of people apply – but only a few make it through the requirements. There are two primary reasons why they fail. First, they are unable to raise the money to pay for the technology. The 9003 is non-resource financing, and the budgets are typically \$50M - \$250M – not a small sum. And the second is the inability to meet the IDU requirement and manage the issues that come up.”*

The underwriting process is also very intense, but most stated that the closing fee of 1 to 3% is not unreasonable. The annual debt interest of 5 – 6% could be improved.

# 5. Moving Forward: Opportunities and Recommendations



## 5.0 Recommendations



### **Recommendation 5.1      Prioritize and Staff the Office**

As previously documented in this report, the USDA 9003 Program office significantly lacks the staffing numbers as well as staff with experience in underwriting emerging technologies especially as compared to the US Department of Energy. This can be accomplished by both full-time federal employees as well as contracted staff.

### **Recommendation 5.2      Revise the definition of Innovative Technology**

The Federal Register § 4279.202 defines New Technology as “New or significantly improved equipment, process or production method to deliver a product, or adoption of equipment, process or production method to deliver a new or significantly improved product, of which the first Commercial-

Scale use in the United States is within the last five years and is used in not more than three Commercial-Scale facilities in the United States.”

Commercial technology or “off-the-shelf” technology is allowed to be used in the 9007 REAP loan guarantee by USDA which is for up to \$25 million. The lower cap is due to the lower risk resulting from using the off-the-shelf or previously demonstrated technology. The 9003 Program is a higher risk as it does not use off-the-shelf technology and therefore has a higher cap of \$250M.

However, based on conversations with lenders, applicants and attorneys engaged in the 9003 program it was strongly communicated that the USDA needs to take a more expansive view of innovative technologies already in use to be considered “innovative” if the technology is being applied in a new technological approach that results in the production of Biorefinery, Renewable Chemical, and Biobased Product Manufacturing in the United States.

*“The Secretary of Agriculture needs to instruct the 9003 office to allow the use of existing technologies, otherwise we will lose out to China and the EU. This is about US jobs and the US economy, so let’s be smart about it.”*

Other lenders also suggested that the Secretary of Agriculture could change the wording that “exclusively innovative technologies and first of its kind” be re-stated as ‘encouraged but not exclusively funded”.

### **Recommendation 5.3          Broaden the Definition of 9003 Program**

Given the rapid transition to a net-zero carbon economy, Congress should examine opportunities to expand the types of feedstocks including carbon dioxide and other types of feedstocks are readily available but not currently included in the 9003 program.

### **Recommendation 5.4          Establish Rolling Applications**

Currently, the USDA 9003 Program unless otherwise specified by a notice in the Federal Register, requires the applicant letter of intent to be due no later than 30 days prior to the application due dates – April 1 and October 1, respectively. Many of those interviewed indicated that is a perceived barrier by applicants due to the six-month delay in a rapidly evolving technology sector.



It is recommended that the USDA adopt a rolling application similar to DOE’s loan guarantee programs as authorized in Title 10, chapter 2 Subchapter H of Part 609.4 (c) “The open application period shall be rolling, and DOE may accept Applications at any time.”

### **Recommendation 5.5          Modify the IDU Requirement**

As part of the applicant technical report or assessment, the applicant needs to show, “*reliable evidence showing 120 days of continuous, steady-state production from an integrated demonstration unit (IDU) must be provided to the lender – and to USDA Rural Development – for review and determination of technical feasibility.*

*Reliable integrated demonstration campaign results also must be provided in 30-day intervals – including a comprehensive final technical report by an independent engineer (IE) – at the conclusion of the integrated demonstration period. The integrated demonstration unit must prove the ability to use project-relevant feedstock and produce advanced biofuel, renewable chemical, or biobased product at a yield, unit production level, quantity, and quality consistent with the design basis of the project. The borrower must provide USDA Rural Development sufficient information on the integrated campaign design ensuring that operation duration, quality, and quantity specifications are incorporated into the final design for the commercial facility.”*

There appears to be differences in the interpretations of this section. Industry and those associated with the applicants indicate that it is nearly impossible to have 120-days of consecutive demonstration due to minor repairs that are required as well as issues with supply chains at times for necessary replacement parts. Some believe that USDA will allow for a “pause” in the clock while others believe the clock needs to be re-started.

A couple interviewees suggested that a possible route is to develop an IDU that is not at full scale, but to create an operation that can be run at bench scale and allow a testing engineer to review it until they are technically satisfied. This would validate that the different technologies have been married at scale and has demonstrated the functionality of this marriage. “*This is the purpose of a demo plant -to use the type of equipment that will be used, and to demonstrate that the scale up risk has been mitigated.*” The IDU

should include all relevant processes, including biological processes for major recycles. During the operation of the IDU, it is important to keep the USDA team informed, and to demonstrate sound reasoning. A bench scale demo can show the yields and provide grounds for approval in some cases.

The USDA should customize the technical report requirements in the Part 2 application process to better reflect the detailed information used in the review criteria based on the actual technology or technologies designed for the project.

### **Recommendation 5.6      Improve the Marketing & Outreach of the Program**

This might actually be the most important recommendation from the project team based on our interviews and observations.

Multiple individuals we spoke with emphasized the need to improve external marketing and outreach/communications of the program. It was remarkable to note that only a half dozen people across the country have experience as lenders with this important national program. The low rate of successful applicants (only 50% of the 100 odd applicants have been considered) has led to consistent rumors in the marketplace that the 9003 program is “Very Difficult.”

Major lenders appear not to know much about the program compared to others such as the DOE LPO Title 17 program (Innovative Energy Loan Guarantee Program). As one lender stated, *“The program needs to improve and develop a face to the outside world, as well as appointing someone who is be the lead and face of the program and willing to go out in person and virtually around the country and aggressively market and educate potential applicants and lenders about the program.”*

As a few noted, *“USDA needs someone like Jigar Shaw at the DOE who is routinely engaged with industry and promoting the program.”*

To the project team, this issue is less about the hard-working and dedicated 9003 personnel but rather a result of a lack of commitment of resources to the program to facilitate the appointment of a face and leader of the program as well as continuity of the 9003 staff to minimize turn-over. This is a complicated program that requires an extensive understanding of technologies, finance, evolving

demands of emerging industry sectors as well as understanding of agriculture feedstocks and market competition. The on-boarding and training of staff to get them to a level of understanding and competency dictates an updated strategy to support their retention.

### **Recommendation 5.7 Create an External USDA Advisory Committee**

Related to recommendation 5.4, it is the project team’s belief the USDA would benefit from increased input and partnerships with thought leaders in the BioEnergy, Biorefinery, Renewable Chemical, and Biobased Product Manufacturing sectors. Currently, the USDA has over 4,000 opportunities to serve on advisory committees.<sup>15</sup> We recommend that the USDA evaluate the benefit and necessary resources of time and finances to develop a new **Biobased Economy Innovation and Economics Advisory Council**.

### **Recommendation 5.8 Establish a Tiered Model**

Based on input from interviews, there seems to be a belief that the 9003 program would benefit from a “tiered model”, so that applications of \$50M or less have an expedited pathway<sup>16</sup> as compared to proposals over \$50M.

### **Recommendation 5.9 Explore the Feasibility of a Stage Gate Process**

It was suggested that a stage gate process – in which the process at every major stage in the development of the technology – be reviewed by the USDA and external consultant. This would be an easy approach for eliminating applicants early in the process. “People have limited time, and no one should waste time on projects that won’t make it through.” USDA would need to evaluate the time and organizational benefits for both the applicant team and for the 9003 office that may or may not be realized by such an approach.

*“A higher bar and training/communication by USDA should be set from the beginning – and effective utilization of the stage gate process should be employed to get failing projects out of the system quickly, if they are not making progress.”*

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<sup>15</sup> <https://www.usda.gov/our-agency/staff-offices/office-executive-secretariat-oes/advisory-committees>

<sup>16</sup> As recommended and designed by the recommended new Technical Advisory Committee.



**Recommendation 5.10                      Keep to the Timeline**

It is important to have a strong timeline for the project. Every time a USDA and lender meeting takes place, the progress to the timeline should be reviewed and updated. The timeline documents what they are working on, and what they are doing. A stronger approach to project management is essential, and deadlines need to be kept.

**Recommendation 5.11                      Eliminate sections 7, 9, and Maintenance B in the Technical Report**

As detailed in sections 4.2.2., 4.2.3 and 4.2.4 of this report, these elements are not directly related to the current construction plan, and often cannot be predicted until much later on in the construction process. Instead, it is suggested that the USDA ask individuals what they intend to do in terms of assessments, maintenance plans, and construction planning.

**Recommendation 5.12                      Taxable Bonds**

Another suggestion is that taxable bonds be incorporated into the application process using the debt of the company that is the lender of record. They would buy the bond and then turn around and sell the bond into the market, with the USDA acting as trustees. This lender also suggests that the requirement by the USDOE that multiple sites operated under the same borrower be placed as a single facility plan be employed, instead of making them all separate. It does need to be noted that, “When using taxable bonds it can add 20% - 30% of the cost of the project in sales fees, legal fees, and other costs.”

**Recommendation 5.13                      Develop Improved Guidance for Applicants**

Most interviewed recognized that applicants can benefit from increased guidance, particularly to make it through the Part 2 portion of the application process. Neither the USDA nor the lender are in a position to dedicate the time and resources to help with such guidance – *“the USDA does not have enough time and must remain impartial, and the lender must also remain objective.”*

*“Applicants are often entrepreneurs with big egos who may not listen to anybody – often engineers with no formal training on enterprise risk management, project management, or risk mitigation”* – all areas that are critical in getting through the part 2 requirements.

The proposed external Advisory Committee (section 5.5) would be a good launching point to evaluate the needs and opportunities to provide applicants the appropriate guidance.

**Recommendation 5.14      Reconnect R&D**

Reconnect research, development, and deployment. Eliminated renewable energy division and technology branch – need to reinstate DOE was doing the R&D and then they would graduate into deployment at USDA. Can’t graduate from R&D to deployment anymore.

**Recommendation 5.15      Better Leverage Social Media and the Web**

The office would benefit from a strong and coordinated marketing plan in addition to section 5.4 to market the accessibility, opportunities and utility of the program as well to communication successes by applicants. Currently, the 9003 program has a dedicated web site<sup>17</sup> but would also benefit from additions of visual media and training (e.g. YouTube videos) as well as mainstream social medial sites such as LinkedIn, Twitter, etc.

**Recommendation 5.16      Development of a New 9003 Database**

As described in Chapter 3 of this report, the USDA currently utilizes a manually entered Excel spreadsheet. The ability to undertake necessary analyses requires extensive manipulation and data entry fields and entry descriptions/terms is based on the individual entering the data. With personnel turn-over, that can impact terminology and data consistency. It is recommended that USDA obtain an appropriate software package that can be more effectively used to evaluate and manage the program as well as to develop a user-guide that specifically details how to use consistent terminology and required data to be entered and managed.

**Recommendation 5.17      Codify OMB Review Timeline**

As presented, timelines are very important to applicants and lenders and there has been experiences communicated that the OMB review has significantly delayed loan guarantee process. The managers’ report in the 2018 Farm Bill states that “The Managers intend that the Office of Management and Budget completes the review of all loan proposals within 30 days of receipt”. The 30-day timeframe is

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<sup>17</sup> <https://www.rd.usda.gov/programs-services/energy-programs/biorefinery-renewable-chemical-and-biobased-product-manufacturing-assistance-program>

non-binding and report language is not part of the program statute. It is recommended that the 30-day or 60-day maximum timeframe be required in the next Farm Bill.

### **5.18 Recommendations for Applicants**

Experts we met with developed several key recommendations that are crucial for applicants to increase the likelihood that their project will be funded and succeed in the program.

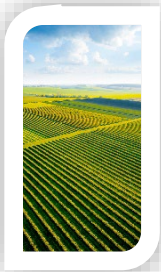
- a. Ensure that the IDU test is functional. If possible, employ current commercialized technology and certify a sufficient level of technical data on the run times to certify that the technology works.
- b. Ensure you have solid feedstock, EPC, and out take agreements. The loan's foundation relies on three things: a non-recourse loan where no one puts money up, a credit rating that is based on a credit-worthy feedstock provider, and a credit worthy off-take provider and EPC contractor.
- c. Work with an independent engineering company that is unbiased and can provide early feedback and suggestions to ensure a successful phase 2 application. Be ready for significant costs associated with environmental and technical assessments as part of your application.
- d. An ability to raise equity and secure the site for construction.
- e. Funding to pay for all consultants (about \$1.5M at a minimum)
- f. A solid credit assessment.



# DYNAMIC SUSTAINABILITY LAB™

## About Us:

The Dynamic Sustainability Lab @ Syracuse University is a pan-university bipartisan research program that examines the opportunities as well as risks and unintended consequences resulting from the rapid transition to a new generation of sustainable technologies, strategies and policies used to achieve a net-zero carbon economy.



**Biobased Transitions**



**Energy Transitions**



**Technology Transitions**

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