Estimating Another Year of Chilled Investment in Advanced Biofuels Due to RFS Uncertainty

- **EPA's Renewable Fuel Standard rules force conventional and advanced biofuel producers to compete for limited shares of the transportation fuel market, discouraging investment in new technology.**
- **BIO estimates that EPA's methodology for setting annual RVOs has caused a $22.4 billion shortfall in investment in advanced biofuels.**
- **EPA has relieved obligated parties of any responsibility to invest in infrastructure for distribution of biofuels and has placed that responsibility squarely on biofuel producers.**
- **Investors have reacted immediately and very strongly to EPA's delays and changes to RFS methodology since 2013.**
- **Investment patterns clearly demonstrate that EPA is sending a sustained market signal that disincentivizes advanced biofuels.**

EPA recognizes that its delays in rulemaking since 2013 have undercut investment in advanced biofuels. The agency fails, however, to recognize that its methodology in the proposed 2014 rule and the proposed and final 2014-2016 rules also undercut investment in advanced biofuels. The agency's rules attempt to force conventional and advanced biofuel producers to compete for limited shares of the transportation fuel market, discouraging investment in new technology. Further, the agency shifts the responsibility and costs of building biofuel distribution infrastructure to biofuel developers, delaying investments in added advanced capacity. Moreover, EPA is using past production figures to project future market space for renewable fuels, a method proposed by the oil refining industry specifically to slow growth in renewable fuel production.

Many advanced biofuel developers also invest in conventional biofuels or intend to collocate production with or license technology to conventional biofuels producers, strategies that create economies of scale in feedstock and production infrastructure. EPA's new methodology forces these developers to choose between protecting sunk capital in conventional biofuel and risking new capital in advanced. Data on

investment in the biofuel sector bears out that EPA's methodology has forced producers to consolidate investment in conventional biofuel production capacity and distribution infrastructure, while sacrificing investment in advanced.

In 2009, Bio Economic Research Associates ("bio-era"), in a report commissioned by BIO, modeled the investment necessary to build an advanced biofuel industry from the ground up to meet the goals of the RFS.[1] BIO now estimates that the impact of EPA's rulemaking delays, unwarranted expansion of its waiver authorities, and methodology for setting annual RVOs has caused a $22.4 billion shortfall in investment in advanced biofuels.

EPA can easily correct course in the 2017 rule by reversing its arbitrary use of the general waiver authority to reduce overall volumes, raising advanced biofuel volumes sufficiently to obviate competition among biofuel developers, and taking seriously its responsibility to ensure that U.S. transportation fuel market is open to every gallon of renewable fuel that can be produced, up to the statutorily set volumes.

EPA Ignores the Impact of Its Rulemakings on Investment

EPA acknowledges that its delays in annual rulemaking failed to drive increased use of advanced biofuels in 2014 and 2015. As the agency states in the final rule for 2014-2016, "The final 2014 standards are based on actual production levels in 2014, possibly suggesting that the 2014 standards we are finalizing are what would have happened in the marketplace absent a rulemaking."[2] And further, "The final standards for 2015 are being set late in the 2015 calendar year, so it is not clear how much extra renewable fuels (and thus costs) the standards are requiring above what the marketplace would have supplied absent them."[3] Allowing the market, which continues to be dominated by oil companies, to set required volumes of renewable fuel is flatly inconsistent with the statutory goal of the RFS.

The agency clearly understands the need for stability in the RFS rulemaking process in order to drive investment. In its Response to Comments on the proposed RFS rules for 2014-2016 the agency acknowledges, "In the longer term, sustained

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[1] Bio Economic Research Associates, U.S. Economic Impact of Advanced Biofuels Production: Perspectives to 2030 (Feb. 2009), *available at* https://www.bio.org/sites/default/files/EconomicImpactAdvancedBiofuels.pdf.

[2] 80 FR 77487. Monday Dec. 14, 2015.

[3] 80 FR 77487. Monday Dec. 14, 2015.

increases in volume requirements are necessary to provide the certainty of continued growth in a future market that is needed by investors; the development of new technology won't occur unless there is clear market potential, and it requires multiple years to build new production, distribution, and consumption capacity and to develop the marketing effectiveness among consumers that is needed."[4] And again, in the 2017 proposed rule, the agency states, "Volume requirements over the longer term that are issued in a timely manner and which provide the certainty of a guaranteed and growing future market are necessary for the industry to have the incentive to invest in the development of new technology and expanded infrastructure for production, distribution, and dispensing capacity."[5]

Despite this understanding, the agency disputes that its rulemakings are primarily responsible for a shortfall in investment in advanced biofuels, stating that EPA "does not believe these claims are accurate or supported by the data."[6]

EPA Is Directly Responsible for Lost Investment

EPA acknowledges that its delays in establishing the 2013, 2014 and 2015 annual rules created untenable uncertainty for advanced biofuel producers and impacted investment.[7] The agency also acknowledges that its final 2016 RVO, while issued by the statutory and Court ordered deadline of November 30, 2015, was nevertheless impacted by its previous delays. In the 2017 proposed rule, the agency states, "The 2016 standards were designed to reflect the fact that the 2014 and 2015 standards had not been set by the statutory deadlines."[8] Investment in advanced biofuel continues to fall short of what is needed, and EPA's methodology along with its delays are responsible for that ongoing shortfall.

The agency's proposed rule for 2017 continues to create unwarranted competition between advanced and conventional biofuel producers for a limited share of the transportation fuel market. As the agency states, "Our analytical approach is to first ascertain the maximum reasonably achievable volumes of all types of renewable

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[4] EPA OTAQ, "Renewable Fuel Standards for 2014, 2015 and 2016, and the Biomass-Based Diesel Volume for 2017: Response to Comments." EPA-420-R-15-024, November 2015, 2.3.1, p. 149.
[5] 81 FR 34784. Tuesday May 31, 2016.
[6] EPA OTAQ, "Renewable Fuel Standards for 2014, 2015 and 2016, and the Biomass-Based Diesel Volume for 2017: Response to Comments." EPA-420-R-15-024, November 2015, 7.3, p.687
[7] See, e.g., 80 FR 33120, June 10, 2015,
[8] 81 FR 34798, May 31, 2016.

fuel. Having done so, we next determine the extent to which a portion of those fuels should be required to be advanced."[9] Many of the first cellulosic ethanol producers have made significant investments in conventional biofuels or hope to license their technology to conventional biofuel producers as a bolt-on technology or collocate facilities to create economies of scale. The agency's methodology discourages conventional biofuel producers from investing in advanced and cellulosic biofuel production or allowing collocation, since any market share to be gained from the investment would come at the cost of conventional production. The agency has created a strong incentive for biofuel producers to protect their significant investments in and market share for conventional biofuel and forego (even discourage) investment in advanced biofuel.

Producers who focus exclusively on advanced biofuel production and have no incentive to protect conventional biofuel investments must also be discouraged by EPA's changed methodology. Added to the significant risk of investment in new advanced biofuel technologies is the uncertainty created by EPA's unnecessary move to create competition within the advanced biofuel category between biomass-based diesel producers and other advanced biofuel producers.[10] Developers of new advanced biofuel technologies must now compete for market space with more established biomass-based diesel producers.

Additionally, EPA has relieved obligated parties of any responsibility to invest in infrastructure for distribution of biofuels and has placed that responsibility squarely on the shoulders of biofuel producers, adding to the costs of developing and producing biofuels. The agency states,"[W]e do not believe the statute should be interpreted to require that refiners and importers change the fundamental nature of their businesses so as to comply with RFS requirements."[11] The fundamental nature of obligated parties' businesses is to sell petroleum. EPA clearly understands the costs of this shift, as it notes, "For the [biomass=based diesel] market to continue to expand, it will likely require greater investment per volume of biodiesel supplied, as the new biodiesel distribution facilities will generally have access to smaller markets than the existing facilities, or will face competition as they seek to expand into areas already supplied by existing distribution facilities."[12] Necessary

[9] 81 FR 34785, May 31, 2016.
[10] 81 FR 34810, May 31, 2016.
[11] EPA OTAQ, "Renewable Fuel Standards for 2014, 2015 and 2016, and the Biomass-Based Diesel Volume for 2017: Response to Comments." EPA-420-R-15-024, November 2015, 2.7.1, p.351.
[12] 81 FR 34793, May 31, 2016.

investments in distribution infrastructure by conventional biofuel and biodiesel producers are now competing with investments in additional advanced biofuel capacity and new technologies.

Further, EPA is basing biofuel production projections for coming years on past-year performance, rather than on production or distribution capacity under development. In setting 2017 advanced biofuel volumes, EPA openly assumes "that the supply of conventional and advanced biodiesel and renewable diesel volumes would be equal to those supplied in 2015."[13] And again, the agency states, "Using historic data is appropriate to the extent that growth in the year or years leading up to 2016 reflects the rate at which biodiesel and renewable diesel constraints can reasonably be expected to be addressed and alleviated in the future."[14] This method for making projections was proposed by the American Fuel & Petrochemical Manufacturers, who represent petroleum refiners that directly compete with biofuel producers. The methodology is designed to slow growth of advanced biofuel production by limiting market capacity each year. Limitation on market capacity directly depresses investment in production, as EPA has recognized.[15]

Lastly, EPA has created new uncertainty for advanced biofuel producers by triggering the reset waiver provision of the RFS under 211(o)(7)(F). Using its prior delays in rulemaking as justification, EPA has triggered authority to rewrite the statutory volume table for advanced biofuels contained in 211(o)(2)(B)(i)(II). At present, advanced biofuel producers and their investors have no certainty about the future market for advanced biofuels under the RFS program.

Data Clearly Demonstrates a Predictable Shift in Biofuel Investment

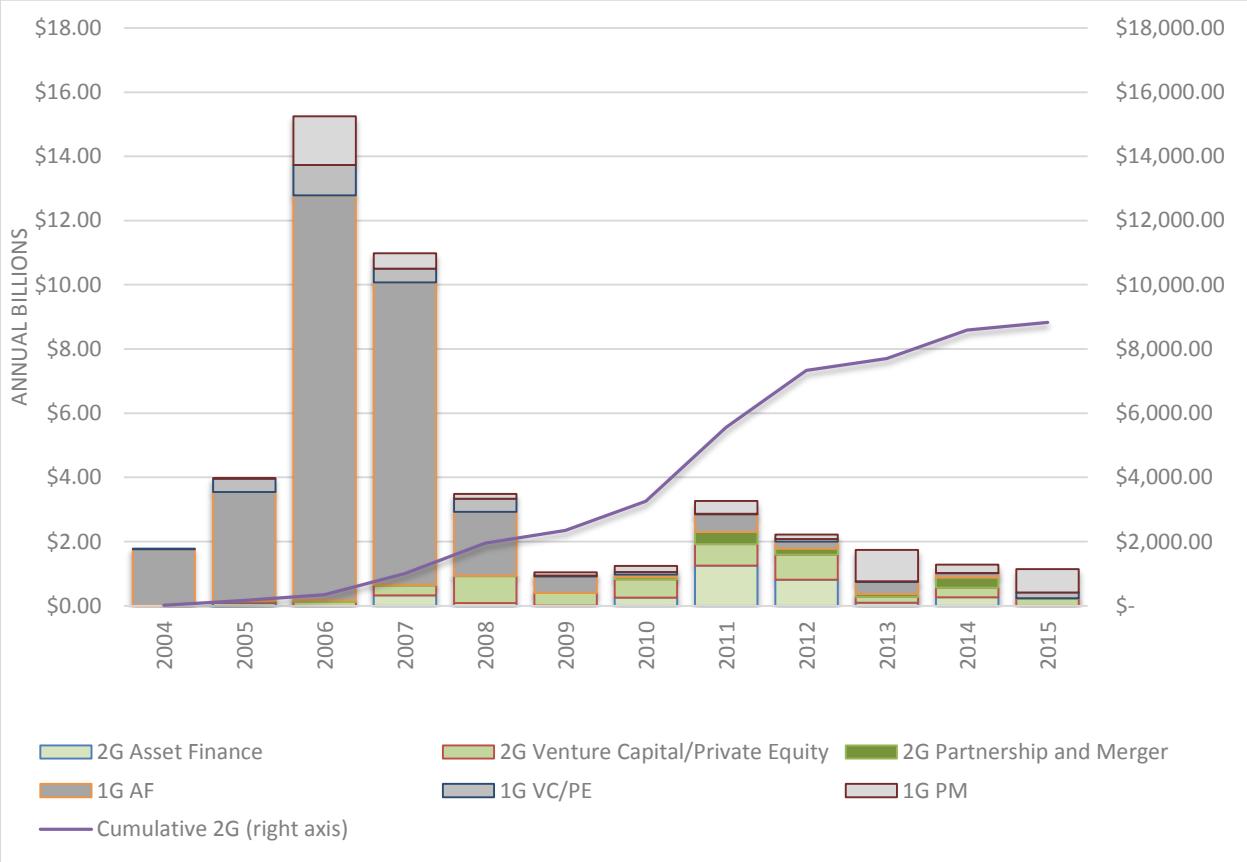
As the data in Figure 1 below demonstrate, investors reacted almost immediately and very strongly to EPA's delays and changes to methodology since 2013. Investment in second-generation biofuel (commercial production as well as piloting and demonstration of advanced biofuel, excluding soy biodiesel) was increasing over time from the establishment of the RFS2 in 2007 through 2012. The type of investment in second-generation technologies was also beginning to shift from venture capital and private equity, which is characteristic of early stage

[13] 81 FR 34786, May 31, 2016.
[14] 81 FR 34795, May 31, 2016.
[15] See, e.g, EPA OTAQ, "Renewable Fuel Standards for 2014, 2015 and 2016, and the Biomass-Based Diesel Volume for 2017: Response to Comments." EPA-420-R-15-024, November 2015, 2.3.1, p. 149. And 81 FR 34784. Tuesday May 31, 2016.

technologies, to partnerships, mergers and asset financing (or debt equity), which is more characteristic of a maturing industry. New commercial-scale cellulosic and advanced biofuel biorefineries began to start up operations in 2013 and prove production technologies and processes. Yet, no new commercial-scale production facilities have broken ground in their wake.

Instead, in 2013 there was a sharp drop in investment in advanced biofuel production and an increase in first-generation partnerships and mergers. While there was some renewed activity in 2014 – to roughly half the level occurring in 2012 – as long-planned facilities began construction, investment activity once again dropped off in 2015. There were no asset financing deals reported during 2015.

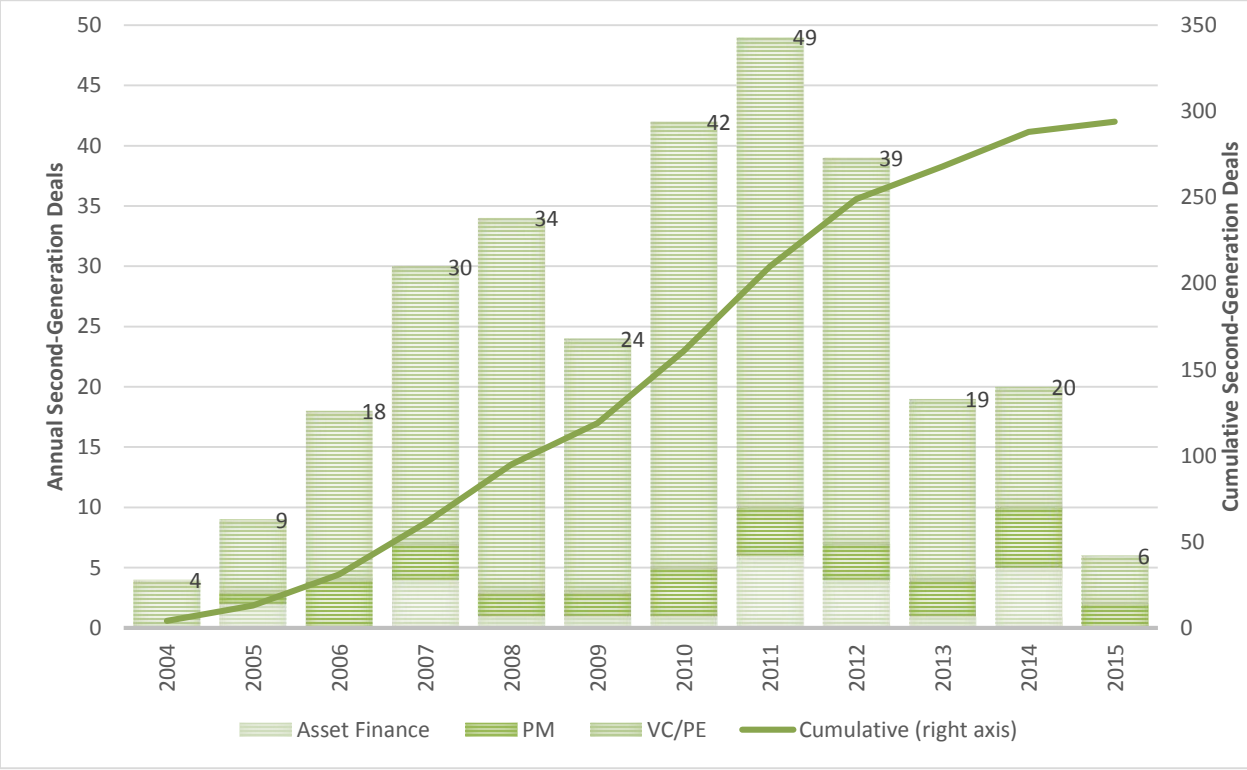
Figure 1: Annual Investment in First- and Second-Generation Biofuels By Type



Data from Bloomberg New Energy Finance; Ocean Park Advisors; United Nations Environment Programme.

The data on the number of announced second generation production deals display the same pattern, with the number of deals climbing through 2012 but sharply dropping from 2013 through 2015, as shown in Figure 2 below. It is both EPA's delays in RFS rulemakings and its methodology that undercuts the high-value asset finance or partnering investments necessary to continue progress in building large-scale production facilities. In fact, the methodology has had a demonstrably larger impact. The number of deal announcements in 2014 was similar to the number in 2011 –even though the overall value of the deals was cut in half – while EPA delayed finalizing a rulemaking it had proposed in 2013. But the number of deals shrank considerably in 2015 as EPA first issued a proposal and then finalized a rule setting in stone a damaging methodology.

Figure 2: Annual and Cumulative Number of Second-Generation Biofuel Deals by Type



Data from Bloomberg New Energy Finance; Ocean Park Advisors; United Nations Environment Programme.

The pattern for advanced biofuels contrasts with investment patterns in first-generation (corn ethanol and soy biodiesel) biofuel production. Investments in first-generation biofuel production peaked in 2006 – as the RFS1 spurred a rapid

increase in renewable fuel production to meet increasing requirements – and primarily consisted of asset financing, characteristic of a more technologically mature industry. Importantly, additional investments – primarily through venture capital or partnerships – in new processes and in innovation to increase productivity and efficiency continued through 2014. The conventional biofuel industry reached the capacity to produce 15 billion gallons, enough to fill the market that Congress made available to them in setting the statutory volumes. EPA's methodology change sparked new investment in 2015 in first-generation distribution infrastructure – directing it away from advanced biofuels. The largest single private equity deal in 2015 was an investment in a first-generation ethanol storage and distribution facility. Additionally, there were 10 acquisitions and mergers among conventional ethanol and biodiesel production facilities.[16]

EPA's Methodology Continues to Chill Needed Investment in Advanced Biofuel

The chilling effect of EPA's rulemaking delays and methodology has resulted in an estimated $22.4 billion shortfall in needed investment for advanced biofuel production capacity.

The advanced biofuel industry has invested billions of dollars since 2009 to build first-of-a-kind biorefineries around the world, even during a global economic recession, as shown by data in Figure 1. Companies commercializing new advanced biofuel pathways have spent years building and operating pilot and demonstration facilities in order to assure investors – and satisfy requirements of the USDA and DOE biorefinery loan guarantee programs – of the viability of projects.[17]

Several cellulosic biofuel producers now have achieved commercial production, and additional companies continue efforts to commercialize new processes. The advanced biofuel industry has reached a commercial stage where additional biorefineries can be built and operated based on existing designs and optimized processes, which can rapidly lower capital costs for advanced biofuel. But many projects have been put on hold since 2013. The chill in investment has had the heaviest impact on the cellulosic biofuel industry.

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[16] Bruce Comer, "2015: A stong year for biofuels M&A," Biofuels International, Jan./Feb. 2016, p.33.

[17] *See, e.g.*, USDA, *USDA BioRefinery Loan Guarantees – Application Guidance Overview* (Mar. 2011), *available at* http://www.rd.usda.gov/files/BCP_Energy_LEAP_9003_ApplicationProcessing_Mar11.pdf.

In 2009, Bio Economic Research Associates ("bio-era"), in a report commissioned by BIO, modeled the investment needed to build an advanced biofuel industry from the ground up to meet the goals of the RFS.[18] Drawing on available pre-commercial biorefinery engineering and design studies, bio-era estimated that more than $95 billion in cumulative capital investments would be needed between 2009 and 2022 for construction of nearly 400 advanced biofuel biorefineries with the capacity to produce 23 billion gallons of advanced biofuel. Figure 3 below shows bio-era's estimated annual and cumulative capital investments needed to maintain the production ramp up envisioned in the RFS.

Added to the annual investment for construction costs are the annual operating costs for that new capacity. Given the challenges of simultaneously constructing biorefineries and building supply chains for new energy crops, the actual capital requirements for many first-of-a-kind cellulosic and advanced biorefineries have been higher than originally projected. Investors have required that the advanced biofuel industry engage in a capital-intensive process of ramping up pilot and demonstration biorefineries before building commercial ones.[19]

To reach the 2016 RFS goal of producing 7.25 billion gallons of advanced biofuels, bio-era estimated the need for 153 operating plants requiring $32.03 billion dollars in cumulative investment. As of June 2016, there are six commercial cellulosic biorefineries with a combined capacity of more than 75 million gallons registered and operating to meet the goals of the RFS, along with several pilot and demonstration plants that have contributed volumes. Additionally, there are 36 biorefineries generating cellulosic biogas and registered to participate in the program.[20] Taking into account additional renewable diesel or jet fuel producers deploying novel technologies, such as Altair, Fulcrum, and Joule/Red Rock, the advanced biofuel industry has reached roughly the level of investment that bio-era originally projected for 2013, as shown in Figure 1. Capacity, however, remains far below what is needed.

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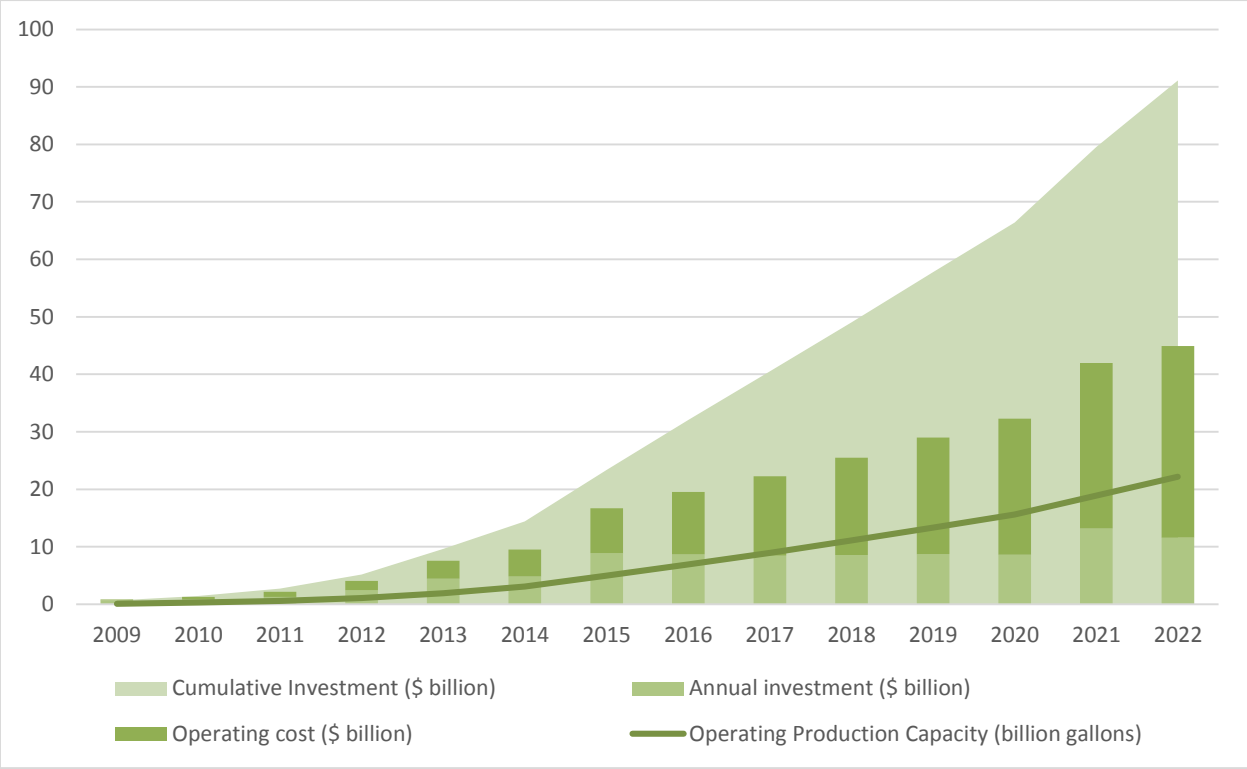
[18] Bio Economic Research Associates, U.S. Economic Impact of Advanced Biofuels Production: Perspectives to 2030 (Feb. 2009), *available at* https://www.bio.org/sites/default/files/EconomicImpactAdvancedBiofuels.pdf.

[19] John May, Financing Genomes: Turning Transformative Innovation into Market Success, Presentation at BIO International Convention (June 16, 2015).

[20] EPA, Part 80: EPA Fuels Programs Registered Company/Facility ID List, *available at* https://www.epa.gov/fuels-registration-reporting-and-compliance-help/registered-companies-and-facilities-fuel-programs (last visited June 15, 2016).

Figure 3: Projected Annual and Cumulative Investments Needed to Build Advanced Biofuel Capacity



The advanced biofuel industry's cumulative capacity-building delay corresponds to a shortfall in investment of more than $22.4 billion since 2013. EPA's methodology and delays in rulemaking since 2013 have been the primary drivers of this shortfall in investment, due to their chilling effect on the industry and investors.

Conclusion

EPA believes that its rules are "creating a sustained market signal to incentivize low greenhouse gas renewable fuels, especially for advanced biofuels."[21] Investment patterns clearly demonstrate that the agency's delays in issuing RFS rules and its unwarranted changes to the methodology of the program are sending the opposite signal. Investors are unwilling to risk hundreds of millions of dollars to produce advanced biofuels for which there is no room in the market or that, worse, will strand their existing investments in conventional biofuel. Without changes to EPA's methodology, the shortfall in necessary investment can only grow worse.

[21] 81 FR 34803, May 31, 2016.

EPA should not doubt "the ability of the standards to bring about market changes in the time available."[22] Its rules and proposals have a nearly immediate impact on investment decisions. Because the proposed rule for 2017 contains the damaging methodology and will create uncertainty for the remainder of the year, 2016 is expected to be another year of chilled investment for the advanced biofuel industry. If EPA finalizes an improved rule by the end of the year, it could send a strong signal to the industry that revitalizes investments, especially in commercially proven and replicable biorefinery technologies.

Among the changes necessary in the final rule for 2017 will be to abandon the unwarranted use of the general waiver authority to create competition between advanced and conventional biofuel producers. EPA should create market space for all renewable fuels that can be produced, up to the volumes established in the statute. EPA must also abandon the methodology that limits future market space to past production performance, due to its chilling effect on new production. EPA has acknowledged that RINs can incentivize infrastructure for and consumer marketing of higher renewable fuel blends.[23] The agency should allow the RIN system to work, rather than place infrastructure and marketing costs entirely on renewable fuel producers.

[22] 81 FR 34782, May 31, 2016.
[23] Dallas Burkholder, "A Preliminary Assessment of RIN Market Dynamics, RIN Prices, and Their Effects." Office of Transportation and Air Quality, US EPA, May 14, 2015.