CHAPTER 13

US Government Bioproducts Policy "Watch What We Do, Not What We Say"

ROBERT E. KOZAK[a,b]

[a] Advanced Biofuels USA, 507 North Bentz Street, Frederick, MD 21701, USA; [b] Atlantic Biomass Conversions, Inc., 507 North Bentz Street, Frederick, MD 21701, USA
Email: AtlanticBiomass@aol.com

"Watch what we do, not what we say"
US Attorney General John Mitchell, 1969.

Shortly after taking office, Richard Nixon's Attorney General made this statement to the press explaining how they should measure the policies and actions of the incoming Administration. While this statement became infamous during the Watergate investigation, it remains a very straightforward way to measure government policy—look past the speeches and press releases and instead examine the legislation, regulations, and spending policies that were or were not enacted to implement the pronouncements.

13.1 US Bioproducts Policy: Words, but No Deeds

In recent years, much has been written in the trade press, and even in mainstream media outlets, about the potential for a US bioproducts industry to become a substantial economic force that would also make a significant contribution to climate change mitigation. While much of this reporting

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depended on press releases, major sources, reports commissioned by the US Department of Energy (DOE), were often written by US National Laboratories.[1] The imprimatur given to this topic by the involvement of the National Laboratories and the DOE resulted in a strong impression that bioproducts were actually an important policy priority of the United States government.

If such a policy existed, then a strong legislative and regulatory framework should exist as well. Following the pattern of other important US policy priorities—the reduction of ozone causing pollutants, the production of ''tight oil,'' or the destruction of terrorist organizations—a policy framework would include such elements as enforceable standards, mandatory government funding, and favorable tax policies.

However, a search for the Congressional legislation or Executive Branch regulations that would have established such a US bioproducts policy found that neither Congress nor a Presidential Administration ever created the necessary framework.

Instead, the only enabling legislation passed by Congress to include anything on bioproducts is the series of US agriculture enabling legislation referred to as ''Farm Bills''. Beginning with the *Farm Security and Rural Investment Act of 2002,* Public Law 107–171 (and continuing up to the *Agricultural Act of 2014*, Public Law 113–79), something called *Section 9002-Federal Procurement of Biobased Products* was included.

While the title of this section sounds as if Congress is directing the US government to use its substantial buying power to create an ''early adopters'' market for bioproducts, that is not the case. Section 9002 continues to this day to lack any legally enforceable requirements for government purchases of biobased products. Nor did it establish legally enforceable requirements for the inclusion of biobased products in consumer goods. Instead, the language of section 9002 includes numerous methods for government agencies to avoid purchasing bioproducts.

> (b) PROCUREMENT SUBJECT TO OTHER LAW—Any procurement, by any Federal agency, which is subject to regulations of the Administrator [of the Environmental Protection Agency] under section 6002 of the Solid Waste Disposal Act (42 U.S.C. 6962), **shall not be subject to the requirements of this section to the extent that such requirements are inconsistent with such regulations**.
>
> (2) AGENCY FLEXIBILITY—Notwithstanding paragraph (1), an agency **may decide not to procure** such items if the agency determines that the items—
> (A) **are not reasonably available** within a reasonable period of time;
> (B) **fail to meet the performance standards set forth in the applicable specifications** or **fail to meet the reasonable performance standards of the procuring agencies**; or
> (C) **are available only at an unreasonable price.**

The clause ''*fail to meet the reasonable performance standards of the procuring agencies*'' is especially telling in its generality. Rather than requiring an agency to use product specifications to make purchasing decisions, it allows agencies to adopt their own performance standard that could rule out bioproducts in general.

Furthermore, while the argument can be made that flexibility is needed to implement government programs, compare the directive clause in (2) Agency Flexibility, ''*may decide not to procure,*'' with the directive clause ''*shall make*'' used in other sections of the Farm Bill when Congress wanted to make clear that an action was to happen.

SEC. 1116. PRICE LOSS COVERAGE.
Agricultural Act of 2014, Public Law 113–79

(a) PRICE LOSS COVERAGE PAYMENTS.—If all of the producers on a farm make the election under subsection (a) of section 1115 to obtain price loss coverage or, subject to subsection (c)(1) of such section, are deemed to have made such election under subsection (c)(2) of such section, the **Secretary shall make price loss coverage payments** to producers on the farm on a covered commodity-by-covered-commodity basis if the Secretary determines that, for any of the 2014 through 2018 crop years—(1) the effective price for the covered commodity for the crop year; is less than (2) the reference price for the covered commodity for the crop year.

A further indication of the lack of priority given to bioproducts by Congress and Presidential Administrations is that the quantity or value of government bioproducts purchased under Section 9002 is not known by the US Government. The legislation did not include any mandatory reporting and the first effort by a President to require Section 9002 purchasing information was through a Presidential directive by Barack Obama in 2014. As of October 2014, according to Agriculture Secretary Tom Vilsack,[2] only the Department of Agriculture is preparing a report.

A similar approach of appearing to establish a bioproducts policy while also providing provisions to limit implementation is present in a change enacted to Section 9003, *Biorefinery Assistance,* of the *Agricultural Act of 2014*. The revised Section 9003, now called *Biorefinery, Renewable Chemical, Biobased Product Manufacturing,* extends the US biorefinery federal loan guarantee program to bioproducts production. However, additional new wording in Section 9003 capped the bioproducts portion of the loan program to 15 percent and allowed a lower percentage at the prerogative of the Secretary of Agriculture.

(B) BIOBASED PRODUCT MANUFACTURING.—Of the total amount of funds made available for fiscal years 2014 and 2015 under subparagraph (A), the Secretary **may use for the cost of loan guarantees under this**

section not more than 15 percent of such funds to promote biobased product manufacturing.

The effect of this new provision has not yet been seen. However, given that the hardware and chemical/enzyme systems needed to convert biomass to bioproducts are more complex than those needed to produce ethanol or biodiesel, the maximum of 15 percent of funds available for all biorefinery-related loan guarantees will most likely not cover the costs of bringing innovative bioproducts systems on line.

In addition, given the lack of industrial funding by financial institutions since the 2008–2009 bank bailout, it is hard to see the 15 percent investment cap bringing much private funding to innovative bioproduct production (see Chapter 15 for discussion of financing).

13.2 Why Is There a Lack of US Bioproduct Policy?

In the US, putting a new legislative and regulatory framework that "has teeth" in place has become increasingly difficult because of the entrenched nature of those interest groups and industries benefitting from existing programs. Two approaches are generally used to overcome these roadblocks:

- Assemble coalitions to exert simultaneous pressure on legislative and executive branches. The Iron Triangle approach.
- Attach a new product or policy to existing legislation or regulations, often in a non-related area. The Accidental Policy approach.

In the case of bioproducts, the emerging bioproducts industry is not large enough to fund the type of coalition needed to make an Iron Triangle approach effective. In addition, this industry has not yet identified a high priority (and funded) US program where bioproducts could make a critical contribution.

13.2.1 In Washington, Size Matters

A widely used term to describe how the federal government works in Washington is Iron Triangle (Figure 13.1).

Iron Triangles exist in many different policy areas: national defense, banking, petroleum, and health care, to name a few. As shown in Figure 13.1, startup and maintenance costs of Iron Triangles run high. For example, PACS and "527" fundraising apparatuses were substantial contributors to the multimillion dollar campaign budgets of most 2014 Congressional races.

At present, the US bioproducts industry, and for that matter the US biochemical industry, simply are not large enough to assemble an Iron Triangle on their own behalf.

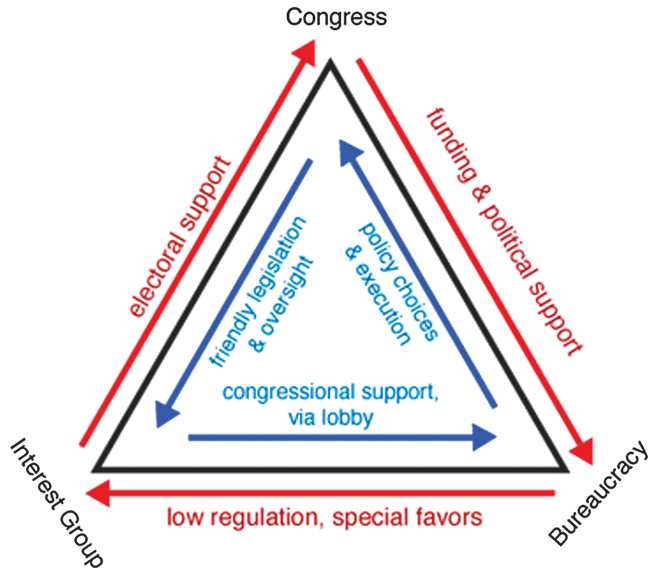

Figure 13.1 The closed, mutually supportive relationships that often prevail in the United States between the government agencies, the special interest lobbying organizations, and the legislative committees or subcommittees with jurisdiction over a particular functional area of government policy.[3]
Diagram from Wikipedia entry on Iron Triangle.

13.2.2 US Biochemical Production: A New, Small Industry

In recent years, the petroleum industry in the US has divided into two largely separate sectors.

- Upstream: large petroleum exploration and crude production companies
- Downstream: small fuel and biochemical refining companies

This separation came about through the sales of many refining and biochemical assets that were seen as being low-margin operations by their large international parent companies, ExxonMobil, BP, Shell, *et al*. As stated in a 2012 Congressional Research Service (CRS) report:

> Although the five major oil companies are integrated firms, the majority of their earnings come from exploration and production activities. For example, in 2011, ExxonMobil earned about 84% of its corporate profits from upstream activities. Chevron earned 92%, and ConocoPhillips earned 66% from upstream activities in 2011.
>
> Some evidence of transition in the U.S. market has been observed. ConocoPhillips announced in 2010 a decision to split into two independent companies, ConocoPhillips, an upstream company, and

Table 13.1 US employment by 2011 US NAICS employment code.

	Total US employment	113 425 965	
NAICS code	Industry name	Number of employees	% US Employment
11	Agriculture	156 520	0.14
3361	Motor vehicle production	136 676	0.12
211	Oil and gas extraction	118 959	0.10
32 511	Petrochemicals	10 398	0.01
325 193	Ethyl alcohol	10 299	0.01

Phillips 66, a downstream company. The company also plans to either sell or close its refinery in Trainer, PA. Sunoco, an independent refining and marketing corporation, has left the refining sector, to concentrate on logistics and marketing, closing and attempting to sell its two refineries in the Philadelphia area.[4]

The resulting US biochemical industry, which is part of the refining industry, is quite small.

As shown in Table 13.1, which uses 2011 (the latest available) US Census North American Industry Classification System (NAICS) employment codes as a data source, the petrochemical industry employs approximately 10 000 people. By comparison, the farming, motor vehicle, and oil/gas extraction industries each employ over 100 000 people or more than 10 times those in the petrochemical industry. In addition, ethanol production industry employment equals that of petrochemical production.

In addition, while the assumption may be made that the interests of the downstream petroleum industry will be represented by the upstream ''majors'', that is often not the case because their interests are not necessarily mutual.

The 2014 Congressional debate over expanding US oil exports provides an example. Upstream petroleum companies are pushing strongly to increase US exports and their income, while four downstream refiners have formed a group asking Congress to retain current restrictions so that US oil supplies will remain relatively plentiful and lower priced than in the world market.[5] (US West Texas crude averaged about 7 percent less than Brent crude in 2014.[6])

As of 2014, the bioproducts portion of the US biochemical industry is miniscule. Therefore, even if they were able to ally with the petroleum-based portion of the industry, it is hard to see them being able to close the loopholes in Sections 2002 and 2003 of the *Agricultural Act of 2014* or to enact other enforceable legislation through the creation and maintenance of a viable Iron Triangle.

13.2.3 Accidental Policy in the United States

More often than most people in the US policy establishment would admit, significant policy decisions have been a product of an accidental confluence

of actions not directly related to the final policy outcome. US ethanol policy is a prime example of this type of policy making.

13.2.3.1 US Ethanol Policy Resulted from 1990 Clean Air Act Ozone Compliance

The US has the world's largest market for a biofuel (10 percent of all gasoline fuel mixtures are biobased ethanol) and is generally seen as a leader in biomass utilization.

However, the nationwide use of 10 percent ethanol did not come about because of an energy or climate change policy enacted by either Congressional legislation or executive branch regulation. In fact, the inclusion of biobased ethanol in gasoline nationwide was a case of a struggling emerging industry being given the market because: (1) a cancer-causing element of a petroleum competitor was found in water supplies; and (2) ethanol had a key characteristic that would save petroleum refiners money. It was much more accidental than planned.

In the late 1990s, the US Environmental Protection Agency (EPA) discovered that the MTBE (methyl tertiary butyl ether), used as an oxygenate to comply with 1990 Clean Air Act ozone reduction requirements, was a persistent carcinogen that was leaking from underground gasoline storage tanks into natural water systems. Citizen groups nationwide pushed for action and New York and California passed legislation to ban MTBE beginning in 2004.

Midwestern cornstarch ethanol producers that already supplied ethanol as an oxygenate in their home states were more than happy to expand production to replace MTBE in ozone non-attainment regions nationwide. Ethanol plants appeared almost overnight throughout Iowa, Minnesota and other states. By 2007 ethanol (at 10 percent total volume) had not only replaced MTBE in ozone control areas but had become a national *de facto* standard because of its high octane properties.

The 100+ octane anti-knock rating of ethanol, much higher than that of MTBE or similar compounds, allowed petroleum refiners to lower the octane of the gasoline base blend from 87 (US regular grade octane) to 84 and use the 10 percent ethanol to increase the octane. This resulted in a considerable production cost saving for petroleum refiners since the change from 84 to 87 was at the start of the logarithmic portion of the production cost curve.

It should be noted that this refining cost decision was made when the major oil companies owned most of the refining assets in the US. As the previously cited 2012 Congressional Research Service (CRS) report indicated, the major oil companies now focus on total oil sales rather than on maximizing the value of refinery output; thus, their position has changed to oppose increased ethanol content in gasoline or any substitution of biobased fuels for petroleum-based ones as evidenced by their promoting the repeal of the Renewable Fuel Standard (RFS) of the Energy Independence and Security Act of 2007.[7]

13.3 Could a Similar Approach Be Used for Bioproducts?

Could a similar set of circumstances as ethanol experienced come together for bioproducts? That is doubtful given the relatively small GHG and other environmental impacts that replacement of petroleum sources for bioproducts with biobased sources would have.

13.3.1 Cost Effectiveness of Using Bioproducts to Reduce GHG Impacts

As shown in Figure 13.2, Tables 13.2 and 13.3, the portion of US oil and natural gas used by the US petrochemical industry is relatively low. In 2010, the latest year for complete US EIA data:

- Approximately 7.4% of US petroleum production was used for petrochemicals (2.8% as feedstock and 4.9% as products).
- About 4.2% of natural gas was consumed by the chemical industry as non-heating feedstock.

By comparison:

- Transportation fuels accounted for over 74% of petroleum use (10 times the amount of biochemical feedstocks).
- Gasoline alone consumes about 46% of US petroleum use.

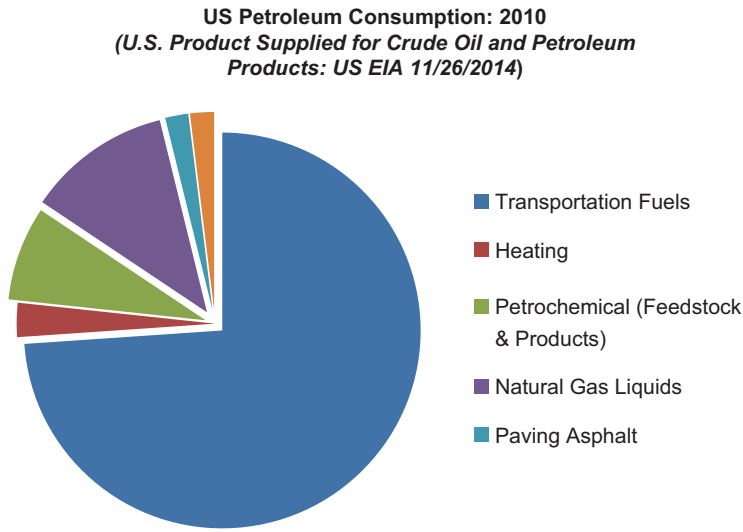

Figure 13.2 US Petroleum Use by Sector: 2010.

Table 13.2 Sources for Figure 13.2. US product supplied for crude oil and petroleum products: US EIA 11/26/2014.

1. Transportation fuels	74.2%
1.a. Gasoline	(46%)
2. Heating	2.8%
3. Total petrochemical	7.7%
3.a. Petrochemical feedstocks	(2.8%)
3.b. Petrochemical products	(4.9%)
4. Natural gas liquids	11.8%
5. Paving asphalt	1.9%
6. Coking	2.0%
Total	100.3%

Table 13.3 2010 US natural gas consumption (US DOE/EIA, March 2013 MECS report, Table 2.1).

Total US NG 2010 consumption (million ft^3)	24 477 425
2010 Chemical consumption (million ft^3)	1 026 000
Chemical % total	4.2%

The cost-effectiveness argument for converting the entire biochemical industry to biomass sources (maximum 7.7 percent of petroleum use), which would require billions in research and construction costs, also has weaknesses when compared to other available biofuel strategies—especially ones that could increase the use of fuels with excess installed production capacity.

13.3.2 A Competing GHG Reduction Approach: Using E30 (30% Ethanol) to Meet US Fuel Economy Standards

In another case of using existing EPA regulations to affect a major technological change, in order to meet the new US fuel economy fleet-wide average of 54.5 mpg in 2020, motor vehicle manufacturers are radically changing engine designs. The change is from low-efficiency, low-compression designs that run on 87 octane fuel, to small, high efficiency turbocharged engines that require octane over 95 to achieve maximum fuel economy and performance. As an extension of E10's use to increase octane, a 30 percent ethanol mixture would provide the octane at a much lower cost than a petroleum sourced compound. This quantity could be provided by using current US ethanol production capacity in combination with near-zero GHG cellulosic and agricultural residue sources.

This ethanol fuel mixture was proposed by EPA in their 2013 Tier 3 proposal.[8] If this proposal was adopted, new ethanol use would replace another 9 percent of US oil consumption. This would be greater than if the entire US chemical industry, 7.7 percent, were to switch to biobased sources.

13.4 Possible Strategies to Develop a US Bioproducts Policy Framework

Since the US bioproducts industry has a difficult case to make when it comes to creating new jobs or providing a cost-effective GHG mitigation strategy as a reason to invest resources in its development, a possible alternative approach would be to use national security or national strategic resources as a way to develop bioproducts production systems.

An example of this is the rubber industry. Portions of the industry and some European governments are investing in natural rubber crops and production systems that could function outside of the narrow band of East Asian geography where all natural rubber currently comes from.[9] While the geopolitical reasons for this research are self-evident, the technical reason is that despite over seventy years of research, only natural rubber is able to provide the performance characteristics needed in aircraft and high-performance motor vehicle tires.

Another example is the decision by the US Navy to use biofuels for Navy jets and non-nuclear surface vessels (The Great Green Fleet). The goals established by US Navy Secretary Ray Mabus, Table 13.4, and the solicitations for fuel purchase beginning in 2014[10] have almost singlehandedly pushed bio-jetfuel into commercial production. This US Navy project is a classic example of using the substantial buying power of the US Government to create an ''early adopters'' market for bioproducts.

13.5 Conclusion: ''Watching What They Do, Not What They Say''

By looking past the speeches, commissioned reports, and press releases and instead examining the applicable legislation, it is clear that the US government has not created the legislative, regulatory, or spending frameworks necessary to implement the bioproducts policy pronouncements made in those documents.

Furthermore, the divestment of downstream refining and biochemical assets by the petroleum majors has left the US biochemical sector without the political and financial assets to create an effective bioproducts policy on their own.

Unless the supporters of bioproducts in and out of the industry pursue creative approaches, including identifying bioproducts production

Table 13.4 Biofuel goals of the US Navy (http://greenfleet.dodlive.mil/energy/great-green-fleet).

Year	Biofuel consumption (million gallons)
2016	3 360 000
2020	336 000 000

technologies or specific products that could fulfill high priority national security needs, it is doubtful that any significant change in US bioproducts policy or significant growth in the US bioproducts industry will occur in the near future.

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