ENERGY NATIONALISM, CONSUMER STYLE: HOW THE QUEST FOR "ENERGY INDEPENDENCE" UNDERMINES U.S. ETHANOL POLICY AND ENERGY SECURITY

Antoine Halff*

INTRODUCTION

On the face of it, biofuel policy is a success story. Many countries around the world are looking to boost the biofuel share of their energy mix. Their reasons for doing so seem compelling. They include, *inter alia*, cutting oil consumption, diversifying fuel supplies, improving energy security, cutting greenhouse gas emissions, protecting air quality, and supporting agriculture. And global biofuel production is growing. In the United States alone, the ethanol market nearly quintupled from roughly 110,000 barrels per day (bpd) (1.7 billion gallons per year) in 2000, to an estimated 540,000 barrels (8.2 billion gallons per year) by the end of 2007,[1] replacing more than 5% of gasoline demand.[2] Building on their success, governments in both mature and

* Deputy Head of Research, Americas, at Newedge U.S.A, LLC, New York, and Adjunct Professor of International and Public Affairs, Columbia University. The views expressed in this article are strictly those of its author.

1. Author's estimate.

2. *See* ENERGY INFO. ADMIN., U.S. DEPT. OF ENERGY, ANNUAL ENERGY OUTLOOK 2008 (EARLY RELEASE): LIQUID FUELS SUPPLY AND DISPOSITION (2008) (containing official U.S. gasoline and oil demand forecasts to 2022 and beyond), *available at* http://www.eia.doe.gov/oiaf/aeo/excel/aeotab_11.xls. Note that the early release version of the Annual Energy Outlook 2008 reference case did not take the Energy Independence and Security Act of 2007, Pub. L. No. 110-140, 121 Stat. 1492 (codified as amended in scattered sections of the United States Code), into account. *See* ENERGY INFO. ADMIN., U.S. DEPT OF ENERGY, ANNUAL ENERGY OUTLOOK 2008 (EARLY RELEASE), *available at* http://www.eia.doe.gov/oiaf/aeo/. At the time of writing, the Energy Information Administration was preparing a revised reference case including the impact of the new energy act. *Id*.

emerging economies are setting ambitious mandates and consumption targets. In the United States, the Energy Independence and Security Act of 2007, signed into law on December 19, 2007, calls for ethanol usage of 36 billion gallons (2.35 million bpd) by 2022,[3] replacing roughly 20% of forecasted gasoline demand and 10% of total projected oil consumption. In the United States, as in other economies, support for biofuel policies is broad-based, spanning a remarkably diverse constituency of stakeholders across national boundaries and party lines.

Yet after a rapid take-off, the biofuel industry is entering a zone of turbulence. Despite the protection of subsidies and import tariffs, the industry finds itself on increasingly shaky economic grounds. Production costs, far from declining with time as had been expected, have surged in part because of soaring demand for feedstock crops. Plant construction costs have ballooned. In contrast, biofuel prices have failed to keep up with costs, raising questions about the economic viability of new projects and causing a flurry of construction delays and project cutbacks at U.S. ethanol companies from mid-2007 onwards. After an early surge in the spring of 2006, when pollution concerns caused the phasing out of gasoline additive methyl tertiary butyl ether (MTBE), U.S. ethanol demand growth quickly fizzled. Relatively low ethanol prices compared to those of gasoline revived buyer interest somewhat in late 2007, but whether demand growth can keep up with production capacity is unclear. At the same time, doubts are mounting about the comparative advantages of biofuels, notably U.S. corn-based ethanol, as an energy source. The broader economy is being hurt as surging fuel demand for corn, wheat, sugar, and other crops has lit a fuse under food prices. One prominent example has been the rise of Mexican tortilla prices. Concerns have also been mounting about the social, political, and economic implications of food/fuel competition for finite land and crop resources. Even the environmental benefits of biofuels are being challenged amid questions about the energy costs of producing biofuels and other environmental concerns such as water and air pollution. Early biofuel critics are finding a growing mainstream audience. A backlash is brewing.[4]

---

3. Pub. L. No. 110-140, § 202, 121 Stat. 1492 (amendment effective 2009).

4. Recent high-profile academic critiques of U.S. biofuel policy include—but are not limited to—C. Ford Runge & Benjamin Senauer, *How Biofuels Could Starve the Poor*, FOREIGN AFF., May/June 2007 (focusing on biofuel impacts on food supply and prices), and WATER SCI. AND TECHNOLOGY BD., NAT'L ACADS., WATER IMPLICATIONS OF BIOFUELS PRODUCTION IN THE UNITED STATES (2007) (emphasizing water supply and quality). In addition to the National Petrochemical and Refiners Association, industry groups critical of ethanol and renewable fuel mandate policies include such organizations as the American Meat Institute and the Grocery Manufacturers Association. *See* Lauren Etter, *Ethanol Industry Is Losing Clout in Congress as Food Prices Climb*, WALL ST. J., Oct. 11, 2007, at A8. Jean Ziegler, UN Special Rapporteur on the Right to Food, called using food crops for biofuels a "crime against humanity." Lauren Etter, *Ethanol Campaign Takes on Detractors*,

The unintended consequences of biofuel expansion are causing a groundswell of criticism. But however real the problems may be, blanket rejection of biofuel policies does not offer a practical option—nor is it wholly justified. Lost in the debate is the fact that the perverse effects of biofuel production are greatly compounded, if not provoked, by the nationalist bias of western energy policies. Many adverse effects of biofuels could be averted, or at least mitigated, by denationalizing production, as some countries have done. In the United States and Europe, though, renewable energy policies have a needlessly strong, if understandable, national component: domestic production is seen as essential. Supporters embrace biofuels not just as a sustainable alternative to hydrocarbons, but as a homegrown substitute for foreign oil—a tool of energy independence. In that sense, renewable fuel policies can be seen as the consumer version of oil producers' resource nationalism – especially in the United States, where small-scale ethanol plants are glorified as the end-user's answer to the proverbial oil weapon, the nation's own secret weapon against rogue petro-states. That national focus of American renewable fuel policy has deep roots in the broader identification of energy security and import independence in U.S. energy policy. It admittedly offers the advantage of political expediency, having helped to broaden support for ethanol from environmentalists to farmers to people concerned about dependence on the Middle East. In the end, though, it may be counterproductive.

Broadly speaking, the quest for energy independence stands in contrast with the broader trend towards greater economic integration. It assumes that the generally recognized benefits of globalization end where the energy sphere begins. But in energy, as in other economic sectors, protectionism fosters inefficiency. U.S. ethanol policy, as this article hopes to demonstrate, is a case in point. When it comes to biofuels, all countries are not created equal: tropical and subtropical developing countries like Brazil, India, and Indonesia enjoy a clear cost and efficiency advantage over big consumer economies in temperate climates such as the United States and Europe. Protectionist policies designed to boost domestic biofuel production capacity in Organization for Economic Cooperation and Development (OECD) countries while keeping out lower-cost imports have aggravated, rather than narrowed, those differences. Feedstock costs have risen faster for producers in industrialized economies than for their

---

WALL ST. J., Nov. 3, 2007. Non-government charity organizations chimed in, including UK anti-hunger group Oxfam, which targeted the EU biofuel mandate in its November 1, 2007 report. *See* Robert Bailey, *Bio-fuelling Poverty: Why the EU Renewable-fuel Target May Be Disastrous for Poor People*, WALL ST. J., Nov. 3, 2007, *available at* http://www.oxfam.org/en/files/bn_biofuelling_poverty_0711.pdf. Opinion pieces, columns, and editorials critical of ethanol in the mainstream press have become too numerous to cite exhaustively. *See, e.g.*, Kimberley Strassel, *Ethanol's Bitter Taste*, WALL ST. J., May 18, 2007, at A16; Editorial, *Ethanol Backlash*, WALL ST. J., Nov. 12, 2007, at A16; Editorial, *The High Costs of Ethanol*, N.Y. TIMES, Sept. 19, 2007.

tropical and subtropical counterparts. On top of that comes the daunting transportation challenge arising from the dislocation of U.S. ethanol production and consumption centers: domestic ethanol supply comes mainly from the inland Corn Belt region, which paradoxically does not make it much easier to bring to market than if it were shipped from overseas because most of the major demand comes from coastal metropolitan areas. Whether from the standpoint of cost or flexibility, sea transportation is actually advantageous compared to overland transportation by rail, truck, river barge or dedicated pipelines. The end result is that protectionism has arguably undermined, not enhanced, the reliability of U.S. biofuel supply and has aggravated the perverse effects of biofuel production on the broader economy. Lower fuel yields for OECD processors have heightened feedstock requirements, magnifying food/fuel competition for limited crop and farmland resources and boosting food prices beyond what they would have been if the development of international biofuel markets had been unimpeded.

Turning back the clock on recent industry developments is not an option. But it is urgent to recognize that existing investments in U.S. ethanol production capacity can best be protected by opening up the U.S. market to imports, rather than by shielding domestic processors from low-cost, foreign competition. Policymakers must also realize that if further expansion of U.S. biofuel consumption is to be pursued, it may best be met, at least in part, with imported supplies, rather than just increased domestic output. Technological breakthroughs, such as the development of economically viable cellulosic ethanol production capacity, and lower domestic production costs, are more likely to be achieved in free-market conditions than otherwise.

It is also critical to recognize that the broader goals of energy security and energy import independence, which policymakers tend to link with one another, actually conflict – a fact as true of the biofuel industry as of the traditional hydrocarbon energy sector. Indeed, U.S. biofuel policy may be seen as a case study of the wider shortcomings of consumer-style resource nationalism. The protectionist element of biofuel policy undermines, rather than enhances, U.S. energy security. Likewise, the hydrocarbon component of U.S. energy supply would benefit from policy measures aimed at tapping, rather than shutting off, global market resources. The world energy market is becoming increasingly integrated. Emerging economies, led by China and the Middle East, have replaced OECD countries as the world's largest and fastest-growing energy consumers. 'East of Suez' economies account for the lion's share of new refining capacity, much of it export-geared. Global energy trade, once largely centered on crude oil, is increasingly encompassing refined oil products and liquefied natural gas (LNG) as well. All those changes present western countries with challenges, but also with opportunities. An excessive preoccupation with self-sufficiency risks robbing the United States of those advantages, and of the arbitrage opportunities offered by integration with fast-

changing international markets. Emphasizing domestic production capacity alone, whether of biofuels or of traditional hydrocarbons, could do more harm than good to U.S. energy security interests if it precluded necessary investments in port terminal infrastructure and tanker capacity. Upgrading U.S. capability in imports and exports of crude oil, refined products, LNG, and biofuels, with an eye to both boosting emergency surge capacity and cutting transportation costs through economies of scale, is an incontrovertible necessity for U.S. economic development and security in years to come.

I. A TRADITION OF BIOFUEL NATIONALISM

A. *Building on History*

Stripping U.S. biofuel policy of its emphasis on domestic production and self-reliance entails breaking away from a well-entrenched tradition. The quest for energy independence has deep roots in U.S. energy policy and political discourse, stretching from the Arab oil embargo of 1973 and the peak in U.S. lower-48 oil production, to the terrorist attacks of September 11, 2001. More recently it has included a growing sense of energy insecurity fuelled by such factors as rising oil prices, heightened competition for energy resources from China and India, and the anti-Americanism of President Hugo Chavez of Venezuela, a key short-haul supplier. Back in the days of the first Oil Shock, President Richard Nixon set the tone of striving towards energy independence (or something of this nature):

> Let us set as our national goal, in the spirit of Apollo, with the determination of the Manhattan Project, that by the end of this decade we will have developed the potential to meet our energy needs without depending on any foreign energy sources.
>
> Let us pledge that by 1980, under Project Independence, we shall be able to meet America's energy needs from America's own energy resources.[5]

The American biofuel industry was born of that aspiration. In the United States, renewable energy development and import independence have been paired as policy goals since day one of the ethanol industry. The first legislative measures to promote corn-based ethanol began in 1974, in the immediate aftershock of the Arab embargo.[6] Three years later, President Jimmy Carter famously branded the drive to meet energy demands with domestic resources as the "moral equivalent of war."[7] Congress helped the nascent biofuel industry

---

5. President Richard Nixon, Address to the Nation About Policies to Deal with the Energy Shortages (Nov. 7, 1973), *in* THE AMERICAN PRESIDENCY PROJECT (John T. Woolley & Gerhard Peters eds.), http://www.presidency.ucsb.edu/ws/index.php?pid=4034&st=&st1=.

6. *See* Runge & Senauer, *supra* note 4.

7. *See id*.

with a twin policy of ethanol tax credits and offsetting import tariffs designed to deny importers the benefit of those subsidies and protect home producers from lower-cost foreign competitors.[8] While such protectionist measures, and ethanol's subsidization, may be seen as part of broader agricultural 'pork,' their stated rationale and policy justification were, from the onset, embedded in the drama of the energy crises of the 1970s. Farm support and the quest for energy security were thus intimately intertwined in the common goal of boosting domestic energy supply, and thus reducing import dependency, by fostering a homegrown biofuel industry.

Rising crude prices and renewed oil security concerns recently brought farm and energy policy back together again under a common agenda of trade protectionism. President George W. Bush unearthed the ethanol hatchet in his battle against energy dependence, again making domestic biofuel production and reduced oil imports twin pillars of U.S. energy policy. His 2005 State of the Union address showcased legislation that aimed to make "America more secure and less dependent on foreign energy," largely by boosting ethanol consumption through a new biofuel mandate.[9]

Former Vice President Al Gore and other environmentalists have endorsed ethanol on environmental grounds as a 'green' weapon in the fight against global warming. But for President Bush, as for U.S. corn farmers, ethanol's aura of energy independence is an even stronger selling point. Industry observers have noted that "the ethanol industry has . . . become a theater of protectionism in U.S. trade policy."[10] Ironically, the tariff carried by most ethanol imports stands in sharp contrast with the duty-free status of U.S. oil imports. In 2006, elaborating on his vow to break America's "addiction" to oil that was "often imported from unstable parts of the world," Bush made ethanol the centerpiece of his plan to replace more than 75% of Middle Eastern oil

---

8. *See id*. In 1980, both the ethanol tax credit and the secondary tariff on ethanol imports were set at 40 cents per gallon. Currently, all ethanol in the United States, whether imported or domestically produced, receives a tax credit of 51 cents per gallon until the end of 2010. *See* RENEWABLE FUELS ASS'N, THE IMPORTANCE OF PRESERVING THE SECONDARY TARIFF ON ETHANOL 2 (2005), *available at* http://www.ethanolrfa.org/objects/pdf/Ethanol_Tariff_Position_Paper.pdf. The ethanol tariff is 54 cents per gallon. By comparison, Chicago Board of Trade (CBOT) ethanol futures prices in 2007 fluctuated between $1.52 and $2.49 per gallon, while NYMEX Reformulated Gasoline Blendstock for Oxygen Blending (RBOB) futures traded in a range of $1.36 to $2.50 per gallon. (RBOB is the successor contract to the now disused NYMEX Unleaded Gasoline futures contract). In other words, both the blender credit and the tariff were roughly equivalent to between one fifth and one third of gasoline and ethanol future prices, depending on market conditions. *See* Crude Oil Windfall Profit Tax Act of 1980, Pub. L. No. 96-223, 94 Stat. 229 (codified as amended in scattered sections of 26 U.S.C.); Omnibus Reconciliation Act of 1980, Pub. L. No. 96-499, 94 Stat. 2599 (codified as amended in scattered sections of 26 U.S.C).

9. President George W. Bush, State of the Union Address 2005 (Feb. 2, 2005), *available at* http://www.whitehouse.gov/news/releases/2005/02/20050202-11.html.

10. *See* Runge & Senauer, *supra* note 4.

imports by 2025.[11] Doing so, he asserted, would "dramatically improve our environment, move beyond a petroleum-based economy, and make our dependence on Middle Eastern oil a thing of the past."[12] In January 2007, he set the goal of cutting U.S. gasoline demand by 20% in 10 years, in part by boosting the Renewable Fuel Standard from 7.5 billion gallons/year by 2012, the goal enshrined in the Energy Act of 2005, to 35 billion gallons/year by 2017. "When we do that," he added, "we will have cut our total imports by the equivalent of three-quarters of all the oil we now import from the Middle East."[13]

B. *Bipartisan Support*

President Bush's renewable energy policy may be one of his administration's few policies to recently be cheered on both sides of the aisle. In June 2007, the Democratic-controlled Senate passed an energy bill including biofuel targets that closely mirrored those of the White House. It called for production of at least 36 billion gallons a year by 2022 – and, again, focused on energy independence. "The journey to energy independence," Sen. Richard Durbin (D-Ill) announced, "begins with this bill." A version of that bill, with the same ethanol target, was signed into law in December.[14]

On the subject of biofuels and energy independence, politicians on both sides of the 2008 presidential electoral contest have been on the same wavelength. "America is ready for energy independence," proclaimed early on the campaign website of Democratic candidate Hillary Clinton, adding that she had "championed policies that encourage development of alternative energy technologies and reduce our dependence on foreign oil." With a nod to Nixon's Project Independence ambitions, the website also said that Clinton had "proposed an Apollo Project-like program dedicated to achieving energy independence." Website updates later raised the ante, setting the goal of "60 billion gallons of home-grown biofuels available for cars and trucks by 2030" (equivalent to 3.9 million barrels per day) as part of a policy package to "reduce America's reliance on foreign oil and address the looming climate crisis."[15]

Among Republicans, Presidential candidate Mitt Romney agreed in a

---

11. President George W. Bush, State of the Union Address 2006 (Jan. 31, 2006), *available at* http://www.whitehouse.gov/stateoftheunion/2006/.

12. *See id*.

13. President George W. Bush, State of the Union Address 2007 (Jan. 23, 2007), *available at* http://www.whitehouse.gov/news/releases/2007/01/20070123-2.html.

14. Energy Independence and Security Act of 2007, Pub. L. No. 110-140, 121 Stat. 1492 (codified as amended in scattered sections of the United States Code).

15. Powering America's Future: New Energy, New Jobs, http://www.hillaryclinton.com/issues/energy/ (last visited Feb. 18, 2008).

policy article that "the United States must become energy independent" and that we must "end our strategic vulnerability to oil shutoffs by nations such as Iran, Russia, and Venezuela and stop sending almost $1 billion a day to other oil-producing nations, some of which use the money against us." To that end, in another Nixonian echo, Romney called for "an energy revolution" that would be the equivalent of the Manhattan Project or the mission to the moon. It will be a mission to create new, economical sources of clean energy . . . . It will be good for our national defense, it will be good for our foreign policy, and it will be good for our economy. . . . We can all agree that alternative energy sources will be good for the planet. For any and all of these reasons, the time for energy independence has come.[16]

For him, as for Clinton, homegrown biofuel loomed large among the policy tools needed to reach the Holy Grail of energy independence, which he believed could be achieved by "increasing our domestic energy production with more drilling offshore and in the Arctic National Wildlife Refuge, more nuclear power, more renewable energy sources, more ethanol, more biodiesel, more solar and wind power, and a fuller exploitation of coal."[17]

C. *Extrapolating from the Present*

It has become part of the accepted political wisdom that U.S. energy independence is within reach and that alternative fuels are the means by which to achieve it. Energy independence has long been a political buzzword. But there is a newfound, bipartisan confidence in its achievability. Faith in the possibility—and desirability—of energy self-reliance has a lot to do with the recent takeoff of the U.S. ethanol market and industry. It took U.S. ethanol consumption 20 years to inch up from 5,000 bpd in 1981 to 110,000 bpd in 2000, but less than seven years to grow more than fourfold by mid-2007. Nearly all of this growth has been supplied domestically. In the wake of the Energy Policy Act of 2005 (EPACT)[18], which first established a renewable fuel mandate, ethanol refineries have been opening at a furious pace, mostly in the Corn Belt region, sometimes as frequently as one per week. The Energy Act of 2005 initially set the Renewable Fuel Standard (RFS) at 4 billion gallons (260,000 bpd) for 2006, ramping up to 7.5 billion gallons (500,000 bpd) in 2012.[19] Yet, the construction boom has been such that U.S. ethanol production capacity is estimated to have reached 2012 RFS targets as early as September

16. Mitt Romney, *Rising to a New Generation of Global Challenges*, FOREIGN AFF., July-Aug. 2007, at 17, 25-26.

17. *Id.* at 25.

18. Pub. L. 109-58, 119 Stat. 594 (2005) (signed by President George W. Bush on August 8, 2005).

19. *See* 42 U.S.C. § 7545(o)(2)(B)(i) (2008).

2007, five years head of schedule. Even though some plants have since been delayed or cancelled, capacity expansion was expected to pick up momentum in the first half of 2008. At the time of writing, brokerage firm Newedge U.S.A was forecasting U.S. ethanol capacity of 11.05 billion gallons per year (720,000 bpd) by mid-2008, 12.13 billion gallons (790,000 bpd) by the end of 2008, and 13.3 billion gallons (870,000 bpd) at the end of 2009.[20] Extrapolating from these growth rates, it would be easy to project production capacity in excess of 40 billion gallons per year by 2020—numbers that make the Renewable Fuel Standard extension of the 2007 energy bill look almost conservative in comparison.

II. UNSUSTAINABLE PRODUCTION

This exuberance, however, may prove irrational. Recent U.S. ethanol demand growth rates do not appear sustainable without opening the domestic market to imports. Continued reliance on domestic output to support fast-growing consumption targets bumps against twin supply and demand hurdles. In devising the Energy Act of 2007, lawmakers demonstrated that they were aware of those challenges: even as the new legislation nearly quintuples the original RFS standard, it discourages further corn-ethanol capacity expansion beyond already planned facilities by requiring that 60% of the expanded RFS be met by "advanced,"—i.e. non corn-based—biofuels, including 16 billion gallons by cellulosic ethanol. The corn ethanol mandate is thus capped at just 15 billion gallons by 2015, in line with earlier forecasts of planned production capacity. Indeed, the law's year-by-year targets for 2008 to 2015 so closely match the ethanol industry's own construction schedule as to effectively lock in a market for plants already planned or under construction, while raising the barrier for new entrants. However, supplying 15 billion gallons of homegrown corn ethanol by 2015 is a tall order. Sourcing the feedstock and building the transportation capacity required by such large volumes will take investments of billions of dollars while putting pressures on food and agricultural resources that could have easily been alleviated by allowing domestic producers to freely compete against imports. While the expanded RFS mandate theoretically guarantees a market outlet for planned incremental corn ethanol capacity, it does so at considerable cost to taxpayers and the system. That cost does nothing for energy security and could have been mitigated by decoupling biofuel production from the pursuit of energy independence.

---

20. Newedge was formed in January 2008 from the merger of brokerages Calyon Financial and Fimat. The latter played a leading role in 2006-2007 in helping set up the budding financial market for biofuel derivatives.

A. *Supply Constraints*

Supply-side constraints have been widely noted: growing demand for feedstock from the corn-based fuel industry is already testing the limits of U.S. corn production capacity. Even if great strides are achieved in corn acreage, production yields, and the energy content of corn, the supply of farmland appears insufficient to support current production targets. While cellulose ethanol holds great promise, the 2007 Energy Act calls for future cellulose production capacity to supplement, rather than replace, installed corn-based capacity.[21] Retrofitting corn plants to handle cellulose feedstock, even if possible from an engineering standpoint, in practice may raise daunting, and even insurmountable, challenges.

Thanks to surging demand from the ethanol industry, U.S. corn-planted acreage jumped to 92.9 million acres for the 2007-08 marketing year, an astounding 18.6% year-over-year increase and the largest total acreage since 1944. Yet despite this massive gain, ethanol demand, currently projected at 3.4 billion bushels—combined with feed demand of 5.8 million bushels and exports of 2.2 million bushels—was expected to result in only a marginal build in carryout inventories, to 1.3 billion bushels. Based on current ethanol industry demand projections of 4.65 billion bushels and optimistic yield assumptions, demand for corn is expected to exhaust available U.S. farmland capacity as early as the 2008-09 corn marketing year. That means further ethanol capacity expansion could only come at the cost of a steep reduction in corn exports and carryout stocks and ultimately could not be sustained without a dramatic (and unlikely) surge in corn yields or a large-scale replacement of soybean acreage by corn acreage.

In the short run, sourcing enough feedstock to fuel the fast-growing U.S. ethanol industry thus appears to be a daunting challenge. However, the demand may never fully materialize because associated increases in corn prices may soon undermine plant economics to the point of nipping in the bud further capacity expansions. In August 2007, Wall Street expected that most capacity expansions and new plants for which ground had not already been broken would be called off or postponed. By January 2008, trade publications and ethanol industry analysts reported that construction of at least six U.S. plants

---

21. *See* Pub. L. No. 110-140, § 202, 121 Stat. 1492 (amendment effective 2009). The law's Renewable Fuel Standard breakdown mandates ethanol volumes by type of biofuel. *See id*. At the 2022 horizon, the law calls for 36 billion gallons per year of biofuel, including 21 billion gallons of advanced (defined as other than corn) and cellulosic biofuel. *See id*. The law also specifies that of the 21 billion gallons per year of advanced biofuels, cellulosic ethanol must account for 16 billion gallons. *See id*. In other words, 21 billion gallons of non-corn biofuels are mandated as part of the 36 billion gallon overall biofuel mandate. This implies that 21 billion gallons of non-corn biofuels will come in addition to, not as a replacement for, 15 billion gallons per year of corn-based biofuel (i.e, ethanol).

had been halted at an advanced stage of development. Even more grassroots projects were shelved before reaching the groundbreaking stage.[22] Plant financing, once readily available through equity participation or debt, had considerably dried up as rising feedstock and construction costs, volatile ethanol prices, and a flurry of disappointing earnings reports by ethanol producing companies raised questions about long-term profitability. "'Equity money has tightened up considerably'" for new projects, an ethanol plant design company executive was quoted as saying in July 2007, while an industry analyst noted that "'lenders have become more reluctant to lend with higher debt burdens.'"[23] Tighter credit markets in the wake of the sub-prime mortgage crisis in August 2007 did not help. Financing eased later on as depressed ethanol manufacturing margins revived somewhat, but remained largely limited to capacity expansions of existing facilities, as opposed to grassroots projects. Meanwhile, ethanol plant profitability—and economic viability—remained highly exposed to fluctuations in volatile corn prices.

Feedstock supply capacity constraints are thus putting an unexpected crimp on ethanol production growth both physically and financially. Growing demand for limited feedstock supply not only puts further ethanol capacity at risk but could even undermine the economics of existing capacity. These problems could be avoided or mitigated by opening ethanol markets to imports, thereby relieving feedstock pressure and minimizing the risk of unsustainable domestic overcapacity.

Cellulose ethanol could, on paper, alleviate demand pressures on corn and other food crops. But will that promise be fulfilled? First, cellulose ethanol

---

22. U.S. ethanol companies announced a flurry of plant delays and cancellations starting around mid-2007. For example, Orion Ethanol said in a June filing with the Securities and Exchange Commission it had abandoned two construction projects in Kansas "'due to increases in corn and construction costs.'" Rachel Gantz, *Orion Ethanol, Greenhunter Cancel Merger Plans*, OIL PRICE INFO. SERVICE, July 13, 2007. The company also delayed two planned Oklahoma plants for the same reason. *See id.* In October, Agassiz Energy LLC postponed an initial public offering (IPO) and plans to build an ethanol plant in Minnesota. *See* Rachel Gantz, *Minnesota Ethanol Start-up Delays Plant, IPO*, OIL PRICE INFO. SERVICE, Oct. 19, 2007. Biofuel Energy Corporation halted plans for an ethanol plant in Iowa. *See* Rachel Gantz, *Biofuel Energy Halts Plans for Third Ethanol Plant*, OIL PRICE INFO. SERVICE, Oct. 15, 2007. Chippewa Valley Ethanol Company said in a press release it was suspending expansion plans in Minnesota due to project cost increases, new capacity "'coming into the market at a higher rate than the gasoline market can reasonably absorb,'" and the "'lack of a clearly defined path to significantly higher ethanol volumes beyond the 10% blend markets.'" Rachel Gantz, *Chippewa Valley Ethanol Halts Expansion Plans*, OIL PRICE INFO. SERVICE, Oct. 12, 2007. Even more projects were delayed. Ethanol producer E3 Biofuels-Mead LLC and its holding company filed for bankruptcy protection in December 2007. *See* Bill Hord, *Bid to Get Bigger Corn Profits Backfires: Ethanol Plant's Bankruptcy Shows New Risk for Farmers*, OMAHA WORLD-HERALD, Dec. 11, 2007, at D1. Rising costs and falling margins sparked a wave of consolidation in the industry.

23. Rachel Gantz, *Ethanol Building Frenzy Appears Over, Sources Say*, OIL PRICE INFO. SERVICE, July 26, 2007.

technology has yet to become commercially available. Second, future cellulosic capacity seems unlikely to displace installed corn-based capacity. The Energy Act of 2007 called for 16 billion gallons/year of ethanol consumption to be met with cellulose ethanol supply by 2022, and another 5 billion gallons/year with other "advanced" (non-corn-based) ethanol supply. But the law envisions that production as incremental, rather than as a substitute for corn-based fuel. The legislation does not call for a phase-out of corn as ethanol feedstock. Retrofitting corn plants to handle biomass or other feedstock might be technically possible as far as engineering is concerned, yet eminently impractical. Most corn-ethanol plants are small-scale, whereas cellulose ethanol plants will likely require economies of scale to be economically viable, at least at an early stage. Existing ethanol capacity is also mostly scattered far from major fuel consumption markets, in close proximity to grain production centers of the Corn Belt. Converting them to cellulose feedstock will thus add daunting feedstock transportation challenges to the current headache of bringing hard-to-transport ethanol to market. Once the technology comes of age, cellulosic ethanol is thus more likely to spell the demise of corn-based ethanol capacity than to dispel its feedstock problems.

B. *Demand Constraints*

While the ethanol industry's impact on corn markets has been widely publicized, the fact that fast-rising production is also bumping against demand constraints is less broadly recognized. U.S. ethanol demand received a huge boost in early 2006 from the phase-out of methyl tertiary butyl ether (MTBE), a gasoline additive that had been widely used as an oxygenate to manufacture reformulated gasoline (RFG), a gasoline grade mandated in densely populated areas of the East Coast and West Coast. The phase-out of MTBE, which was found to pollute groundwater and pose health risks, almost overnight gave ethanol a near monopoly in the captive RFG market for gasoline oxygenates. Later on, however, U.S. ethanol demand growth stalled, even as production growth gained momentum.

Several factors conspire to constrain U.S. ethanol demand growth. Unlike U.S. gasoline demand as a whole, RFG consumption is itself losing ground, perhaps as a reflection of stagnant or shrinking demographics in its core East Coast markets: while U.S. demand for conventional gasoline grew by 2.5% in the first quarter of 2007 and 2% in the second quarter of 2007, demand for RFG contracted by 1.8% and 1.6%, respectively, over the same period (in the third quarter, both RFG and conventional gasoline demand inched up marginally, by 0.2%).[24] Thus, U.S. ethanol production not only already far exceeds RFG

24. RFG and conventional gasoline demand growth rates calculated by Newedge, based on data from the U.S. Energy Information Administration's (EIA) Petroleum Navigator

blending requirements—the latter averaged roughly 290,000 bpd in the first nine months of 2007, compared to reported domestic ethanol output ranging from 420,000 bpd to 460,000 bpd and averaging 410,000 bpd in the same period—but the captive segment of ethanol demand is inching lower. That leaves rising ethanol production increasingly dependent on discretionary demand from conventional gasoline blenders and distributors.[25]

Economically-driven demand from conventional gasoline blenders did show signs of increasing significantly in the latter part of 2007, as surging oil prices caused ethanol to trade at a widening discount to gasoline blendstocks. This created an incentive for industry to capture that price differential by squeezing as much lower-cost ethanol as possible in the gasoline blend. In November 2007, the ethanol price discount relative to gasoline, coupled with the 51 cents/gallon ethanol blending credit, nearly doubled the so-called gasoline "crackspread," i.e. the difference between crude oil and gasoline prices, a proxy for refining profit margins. However, further demand growth from the conventional sector faces daunting challenges. To be sustained, discretionary demand for conventional gasoline blending requires, by definition, that ethanol keep trading at a large enough discount to gasoline to cover transport costs (as well as one-off infrastructure and logistical expenditures, including new storage capacity costs, dedicated tanks and pumps, etc.). That is far from assured. Mandated demand does not face any such price threshold, but in the event of adverse market conditions, can cause incremental costs to be passed on to consumers, thus putting upward pressure on finished gasoline retail prices. That in turn could undermine demand while also proving politically unpalatable.

Whether mandated or discretionary, conventional gasoline demand growth raises serious regulatory and logistical issues. The former can be rather easily addressed at the state and local levels: in states ranging from Florida to Tennessee, emission standards have been adjusted or waived to allow for changes in gasoline vapor pressure and other effects of ethanol blending that would otherwise cause finished gasoline to violate environmental standards in some areas. Logistical issues are more challenging and cannot be fixed at the stroke of a pen or through legislative changes. Because of the dislocation of U.S. ethanol supply and demand centers, making room for more than 6 billion

---

interactive website. *See* Energy Info. Admin., U.S. Dept. of Energy, Petroleum Navigator, U.S. Crude Oil Supply & Distribution, http://tonto.eia.doe.gov/dnav/pet/pet_sum_crdsnd_adc_mbbl_m.htm (last visited Feb. 8, 2008). Ethanol production data is from the EIA's Monthly Energy Review. *See* Energy Info. Admin., U.S. Dept. of Energy, Monthly Energy Review, http://www.eia.doe.gov/emeu/mer/renew.html (last visited Feb. 8, 2008).

25. The California Air Resources Board's decision in June 2007 to raise ethanol blending from 5.7% to 10% of the gasoline blend effective December 31, 2009 (with a two year transition period to 2012) does open up to 600 million gallons per year of incremental mandated demand, however.

gallons/year of incremental homegrown corn ethanol in eight years will take billions of dollars in logistical and infrastructure development—again, an issue exacerbated by U.S. ethanol protectionism.

C. *Logistical Challenges*

More than 95% of U.S. ethanol production capacity is located in close proximity to feedstock sources, in the Corn Belt of the Midwest. But while the Chicago-Detroit area ranks among the top U.S. gasoline markets, the Midwest as a whole accounted for just less than 30% of U.S. gasoline demand in the first quarter of 2007, compared to 37% for the East Coast and nearly 20% for the West Coast (plus Alaska and Hawaii). Coastal markets also account for the lion's share of the RFG market, including 42% for the East Coast and 35% for the West Coast. Corn-growing areas where ethanol is manufactured are comparatively sparsely populated. Supplying U.S. markets with domestic ethanol thus requires overland transportation from rural production centers in the Midwest to core urban markets on the East Coast and West Coast.

This is no small feat. Ethanol's affinity to water makes shipping it technically challenging. Ethanol-blended gasoline cannot be transported by pipeline using the existing product pipeline network and instead must be moved in pure form by truck, barge, or rail. Surging ethanol consumption thus faces major truck, barge, and rail capacity constraints, causing transportation bottlenecks, raising shipping costs, and threatening a backlog of Midwest producer stocks. Producers have already committed considerable investments to expand rail capacity, notably through the construction of ethanol-dedicated, cost-efficient "unit trains" of up to 80 ethanol-only tank cars. However, offloading capacity at the receiving end is limited. There is also talk of building a dedicated ethanol pipeline network using special alloys developed in Brazil to resist ethanol's corrosive effects. However, building such a dedicated transportation infrastructure is hugely time- and cost-intensive.

The logistical constraints facing ethanol are partly a product of U.S. biofuel protectionism. Allowing waterborne ethanol imports from Brazil or other Caribbean and Latin American producers would minimize transportation constraints by providing core RFG markets with a more accessible supply source in close proximity to distribution points. Brazilian imports, which are already seeping into East Coast markets, could be expanded, while the West Coast could tap Central American output and future production expected from Colombia. Domestic U.S. output could be rechanneled towards local markets instead of shipped overland, e.g., through the development of a local market for high-ethanol gasoline blends such as E85 (containing 85% ethanol). Although Latin American and Caribbean markets are in some cases located farther from U.S. coastal demand centers, sea transportation is both more economical and more flexible than overland transport, while also providing the benefits of

economies of scale. Those advantages compound the cost-benefit of sugar-cane Latin American and Caribbean ethanol compared to U.S. corn-based fuel.

D. *Cost Pressures*

The combination of rising U.S. ethanol supply and constrained demand growth has had at times a disastrous effect not only on ethanol expansion plans—including both grassroots projects and plant expansion—but also on the economics of installed capacity. While gasoline prices surged in the first eight months of 2007, spurred by both driving demand growth and refinery capacity constraints, ethanol prices, faced with a looming supply glut, collapsed: a 33% gain in gasoline futures at the New York Mercantile Exchange (NYMEX), from $1.55/gallon to $2.05/gallon, mirrored a 33% decline in Chicago Board of Trade (CBOT) ethanol futures over the same period, from $2.49 to $1.67. Ethanol production costs, on the other hand, surged, driven primarily by soaring feedstock prices. As U.S. ethanol production took off, CBOT corn futures gained roughly 65%, from about $2.60/bushel in January 2006 to a high of $4.30/bushel in mid-June 2007. After a brief retreat early in the summer of 2007, prices soon resumed their ascent, topping $5.00 in mid-January 2008, up nearly 50% from July lows. Surging input costs and falling output prices have proved a deadly mix for ethanol manufacturing margins. In late 2007, the widening discount of ethanol prices relative to those of gasoline revived buyer interest from gasoline blenders eager to capture that spread, providing ethanol markets with renewed support. However, the rally paled in comparison to the surge in corn prices and failed to fully restore ethanol margins, especially at the less efficient plants. To make things worse, plant construction costs have also risen. Corporate profits have been squeezed, including at once highly profitable plants. Ethanol startup companies, once the darlings of Wall Street, have been posting increasingly disappointing results.

The industry's growing reliance on discretionary, price-opportunistic blending, as opposed to mandated RFG blending, has helped expand the ethanol market without necessarily shoring up plant economics. Unlike mandated demand, discretionary blending demand is by definition market-based and will only exist as long as ethanol trades at a deep enough discount to gasoline to offset—in conjunction with the federal ethanol blender tax credit of 51 cents/gallon and other subsidies—rising transportation and blending costs. This is putting further pressure on ethanol prices. Mandating ethanol blending for conventional gasoline would give ethanol processors some relief by expanding captive demand, but it would be both practically tricky, given transportation constraints, and politically difficult, due to resulting inflationary pressures on gasoline prices.

Ironically, the recent fast growth of the U.S. ethanol industry, facilitated by subsidies and import tariffs, has arguably undermined, rather than enhanced,

the industry's stability. Although lower-cost producers such as Brazil have also been facing production cost increases, those pressures have been much more severe in the United States, where corn prices have dramatically surged, even as sugar prices—a proxy for sugarcane prices in Brazil—have recently eased. Increasingly heated competition for limited transportation capacity and needed investments in transport infrastructure also have weighed on the U.S. ethanol industry. Thus, rather than alleviate the U.S. ethanol efficiency deficit, trade protection has made the situation worse. Further expansion of U.S. production capacity can only incur more pain for the industry by cranking up competition for feedstock and transportation, undermining plant economics, and putting existing plants under more stress. In contrast, opening trade barriers beyond the current tariff loopholes would bring existing plants much needed feedstock and logistical relief.

III. BROADER SOCIOECONOMIC IMPACT

The downside of U.S. ethanol protectionism extends far beyond the ethanol industry. Adverse price effects of corn and other food markets not only are undermining the economics of U.S. biofuel production but also are sending ripples through global agricultural markets and world food prices, raising questions about the socioeconomic and political effects of heating up competition for limited farmland and crop resources. Because U.S. biofuel production is less efficient than that of Brazil and other tropical and sub-tropical producers, adverse food price effects have been and will remain more pronounced than would have been the case under free biofuel trade conditions.

A. *Food Prices*

Regional disparities in biofuel production costs and efficiency have been clear to policymakers from the get go. "The cost story differs in developing countries with sunny, warm climates" compared to International Energy Agency (IEA) member countries, the IEA noted in 2004.

> [T]he costs of producing biofuels are much lower in tropical and subtropical countries—especially developing countries with low land and labor costs—than in developed, temperate countries . . . . However, there is a mismatch between those countries where biofuels can be produced at lowest cost and those where demand for biofuels is rising most rapidly.[26]

To some extent, biofuel protectionist barriers have been erected in the United States and other IEA countries to shield domestic producers from lower-

26. INT'L ENERGY AGENCY, BIOFUELS FOR TRANSPORT: AN INTERNATIONAL PERSPECTIVE (2004), *available at* http://www.iea.org/textbase/nppdf/free/2004/biofuels2004.pdf.

cost competition and thus help nurture the development of indigenous production capacity. Yet, while the IEA was expecting OECD production costs to decline over time, those barriers, far from narrowing the cost efficiency gap between IEA members and emerging producers, have actually widened it. Not only have OECD production costs soared, the rapid growth of OECD production capacity has magnified the unintended consequences of biofuel production on global food prices.

In part because U.S. ethanol production is less efficient and more crop intensive than that of Brazil, demand pressures on corn prices have been far more severe than on sugarcane. Corn future prices at the Chicago Board of Trade soared by close to 30% from roughly $280/bushel in late March 2006 to about $360/bushel in late August 2007. In contrast, New York Board of Trade prices for sugar No. 11 (the benchmark sugar contract traded on the exchange) declined by 45% over the same time period, from $17/lb to $9.40/lb. Rising U.S. corn prices have sent shockwaves through U.S.-corn importing economies, including Mexico. Looking forward, rising corn-based U.S. ethanol production looks bound not only to boost U.S. corn export prices but also to curtail corn exports. Prices of other grains and agricultural commodities have also risen dramatically as wheat, soy and other acreage has increasingly been converted to corn, curtailing production.

These problems could be alleviated by boosting reliance on more efficient tropical, sugar-based ethanol production at the expense of corn. Indeed, some non-OECD biofuel producers have been quick to denationalize biofuel production in a bid to minimize food price effects and boost efficiency. One notable example is China, which declared a moratorium on domestic biofuel projects following a 9.2% boost in domestic corn prices in December 2006. Since then, China has shifted its biofuel policy toward developing capacity in Indonesia instead. The difference in policy response partly is due to strikingly different conceptions of energy security: whereas U.S. policymakers tend to identify energy security with import independence, their Chinese counterparts seem to view the acquisition of equity production overseas as the best way to enhance supply security in the face of domestic supply constraints.

B. *Land Use and Deforestation*

One concern with developing tropical and subtropical biofuel capacity in countries such as Brazil and Indonesia is the impact on deforestation, specifically the destruction of the rainforest. While this is a serious worry, it must be recognized that U.S. ethanol production growth also has had an adverse impact on the Brazilian rainforest. Some U.S. soy acreage has been converted to corn, pushing off soy planting to Brazil, where new soy acreage has been carved out of the rainforest. Because corn-based ethanol production is less efficient than sugar-based production, its farmland demands are also

arguably greater than that of sugar-based ethanol processors.

IV. SUPPLY INSECURITY

Part of the rationale for developing OECD biofuel capacity has been to enhance fuel supply security by cutting exposure to oil export disruptions, whether politically driven or otherwise. Ironically, though, the reliance on domestic biofuel output, as opposed to lower-cost biofuel imports, has in some ways undermined supply security by introducing new supply risks in the market—and new drivers of market volatility—while at the same time exacerbating risks to traditional energy supplies. Those new risks stem from the unpredictability of weather conditions and crop success or failure. Those risks exist everywhere, but are greater for temperate OECD producers than for warm-climate ones. Protectionism also heightens the risk exposure of western market participants by restricting their supply sources and denying them the benefit of biofuel supply diversification. On the traditional hydrocarbon front, the nationalist bias of western renewable fuel policies has made them a greater source of concern for oil producers and domestic refiners than would otherwise have been the case.

A. *Weather Risks*

Instead of increasing supply security, switching away from hydrocarbon fuels towards biofuels may merely trade a political supply risk for a weather supply risk. Meteorological conditions, a proverbial wildcard, can greatly affect crop success or failure, and the latter in turn can have a huge impact on biofuel output. Increasing the biofuel share of a country's energy mix thus means introducing a new supply risk in its energy markets.

Crop variance may be a greater swing factor for temperate corn-based and other producers than for tropical or subtropical ones. Not only is climate more consistent in warm regions than in continental ones, but sugarcane, grown in tropical or subtropical climates, is prized for its vegetative mass. Unlike corn, which is grown for its kernel, it is therefore not at risk during the brief pollenization stage. While two weeks of hot, dry weather can have a big impact on corn productivity, it would take months of sub-par rains to affect the productivity of sugarcane, which, like a weed, can quickly recover from a few dry weeks.

In any event, liberalizing biofuel markets would give ethanol consumers access to a greater range of supplies, thus minimizing the risk of crop failure in any given location. Likewise, domestic producers could branch out and expand their operations overseas or set up links with foreign producers, thereby spreading their weather risks.

B. *Market Risks to the Ethanol Industry*

U.S. corn-based ethanol producers are also at a disadvantage to their Brazilian and other sugar-based counterparts in that they have less flexibility in market outlets. Brazilian sugarcane processors can make both ethanol and refined sugar and enjoy increasing flexibility to switch production between one and the other depending on market conditions. No such flexibility is afforded to corn-based U.S. processors, most of whom are entirely dependent on the fuel market. There are exceptions: one of the largest ethanol manufacturers in the United States is a major agro-industrial player who is also a large producer of high fructose corn syrup (HFCS). However, the dozens of small-scale ethanol plants that account for a large share of the ethanol industry have no such capability and are single-product manufacturers. Thus, the national focus of U.S. ethanol policy subjects consumers of the fuel—whether supply-chain intermediaries, such as petroleum refiners and gasoline blenders, or final consumers of finished, ethanol-blended fuels, such as motorists and fleet operators—not only to higher risk than would be the case in an open market, but also to greater risks of supplier corporate failure. Greater supply flexibility and north-south producer linkups could help defuse those risks.

C. *Impact on Energy-Producer Dialogue: The Limits of Supply Diversification*

While the development of domestic biofuel industries has theoretically helped industrialized economies diversify their energy sources, in effect it has had a chilling effect on traditional hydrocarbon consumers, thus indirectly heightening oil supply risks. OPEC has repeatedly expressed concerns about the impact of biofuel development on oil demand security. Saudi Arabia, in particular, has explicitly questioned the rationale for further investment in Saudi oil production capacity, in view of a U.S. biofuel policy explicitly designed to cut U.S. dependence on Middle East oil. While in theory U.S. biofuel efforts could compel greater OPEC production in order to depress crude oil prices and undermine ethanol economics, in practice the greater lead time and capital costs of large-scale petroleum development projects, compared with smaller-scale, short lead-time ethanol projects, have increased the perceived risk of oil investments by making future oil demand seem more uncertain. Biofuel subsidies or mandates—or a combination of the two—also render the cost advantages of oil production irrelevant and make it more difficult for oil to compete on price.

Biofuel policy would arguably have become a lesser irritant in consumer-producer relations if it were not associated with protectionism and the stated political objective of depriving oil suppliers of part of their oil export revenue. It is the coupling of renewable fuel policy with the quest for energy

independence that has put in particularly sharp focus the apparent contradiction in U.S. energy policy between the drive to diversify fuel supply away from hydrocarbons and Washington's chronic pleas to OPEC producers to boost exports, increase spare production capacity, and douse upward oil price pressures.

Even as energy producers and consumers have become increasingly aware of their mutual dependence, biofuel policy has thus arguably undermined efforts at greater understanding and rapprochement between them. This adverse effect could have been minimized by dissociating biofuel targets from the quest of energy independence. The protectionist and nationalist bias of biofuel policies has not been lost on oil producers and has been a source of unnecessary frictions between oil exporters and importers. Denationalizing biofuel production would make biofuel policies seem less confrontational.

D. *Impact on Petroleum Refining*

Likewise, plans to displace gasoline demand with domestic biofuel have served as a disincentive for refiners to alleviate current tightness in domestic refining capacity. That has severely undermined the security of U.S. refined product supply, as the lack of refining capacity has been a leading factor behind the recent oil rally and arguably one of the top risks to U.S. energy supply. The perceived threat to U.S. refiners would be more diffuse if biofuel targets were divorced from the imperative of domestic procurement, as the allocation of global biofuel supply and demand would be more closely driven by market conditions and the risk of refining margin distortions would be accordingly reduced.

V. THE BENEFITS OF ENERGY INTERDEPENDENCE AND THE QUEST FOR ENERGY INDEPENDENCE AS A SECURITY RISK

The nationalist bias of U.S. biofuel policy has triggered or at the very least compounded a host of adverse, unintended consequences that could be mitigated or averted if biofuels were freely traded. The consequences extend far beyond the energy sphere itself, as the development of relatively inefficient domestic ethanol production through subsidies and tariffs has exacerbated food price run-ups and other far-reaching effects of biofuel development, even as it has imperiled the very domestic industry it purported to nurture. But there is a silver lining. Recent biofuel policy failures have made clear the pitfalls of energy protectionism. They offer a lesson that resonates beyond the confines of the biofuel industry and that can and must be applied to the broader energy sphere. It is not just the U.S. biofuel market and industry that suffer from protectionism. Greater global market integration would also benefit traditional hydrocarbon markets. Indeed, it may be argued that U.S. energy security

depends less on a rebound in domestic production capacity than on improved import capacity, coupled with demand restraint.

A. *Domestic Production Constraints and the Reality of Import Dependency*

Despite recurrent calls for import independence, the United States has become increasingly dependent on energy imports. But the nature of its dependence has changed over time. U.S. crude import growth has stalled. In contrast, product import dependency is surging. U.S. gasoline imports have gone in twelve years from 3% to 12% of domestic demand, which is itself growing.

Refining capacity, once overabundant, has grown extremely tight. It is unlikely to rebound. Indeed, refining capacity peaked in 1981, shortly after the first oil shock, and has only partially retraced its losses. Growing import dependence is a fact of life. Planned investments in U.S. refining capacity are extremely low. Companies such as Chevron and Exxon are far more willing to build refining capacity in growth markets such as China and India than in the United States. Over the next ten years, the bulk of incremental refining capacity is expected to be built east of Suez, predominantly in China, India, and the Middle East. Some of that capacity will be explicitly geared toward export markets, including plants in Saudi Arabia and India. But all new capacity will considerably increase the potential for cross-regional arbitrage trade, given the inevitable mismatch of domestic production and demand, seasonal changes in consumption patterns, and additional disparities between crude feedstock product yields and domestic requirements. The United States has greatly benefited from tapping international trade opportunities in the past, and will continue to do so, on an even wider scale, in the future.

In addition, the United States will grow increasingly exposed to the risk of domestic product supply disruptions. While aggregate refining capacity has been inching up, the number of U.S. refineries has fallen sharply over the years. The average size of U.S. refineries has surged. That means that problems at any given plant have a far greater impact on supply than would have been in the past. Foreign refineries are also dramatically increasing in size.

B. *The Need for Import Surge Capacity*

Hurricanes Katrina and Rita in 2005, which crippled processing capacity in the core U.S. Gulf Coast refining center, brought home the risk to product supply. Although the United States at the time released some crude from the Strategic Petroleum Reserve (SPR), the lack of operating refining capacity constrained demand for SPR crude. A surge in product imports narrowly met product demand, thanks in part, though not exclusively, to a prompt decision by the International Energy Agency to organize a joint oil release from strategic

stocks. But U.S. import capacity was stretched to the limit, with tankers queuing up for days on the East Coast, raising demurrage costs. Had the winter not been unseasonably mild, which curtailed the need for heating oil, relief efforts would almost certainly have failed to meet demand, and import off-loading capacity would have proved insufficient. Given high hurricane risks in the heartland of U.S. refining, it is critical to upgrade U.S. surge import capacity.

C. *Foreign Refining Capacity as a Security Resource*

Rising refining capacity overseas will help alleviate tightness in the U.S. market. But to tap that opportunity, it is essential to boost U.S. import capacity. Recently, dependence on imports has contributed to run-ups in U.S. energy prices, as domestic prices had to be high enough to offset import costs. In order to minimize the economic burden of product import dependency, shipping costs must be reduced through economies of scale. Large product tankers could be built, on a scale heretofore reserved to crude carriers, to carry refined products from the mega-export refineries planned in Saudi Arabia and India. Offloading facilities must also be developed on the East Coast and West Coast, away from the vulnerable Gulf Coast crude import centers and closer to market.

D. *The Benefits of Energy Globalization and a Multi-Polar Energy Market*

Greater product market integration will help defuse the competitive and sometimes confrontational character afflicting crude markets. Although the rise of Chinese and Indian energy demand is often seen in industrialized economies as a threat, in terms of heightened competition for scarce raw materials, in fact it may herald the emergence of a more triangulated type of energy trade. Just as OECD economies have found it beneficial to off-shore part of their manufacturing and even service industries to Asia, so will the off-shoring of fuel manufacturing to lower-cost production centers prove equally beneficial. A side benefit of the process will be to defuse the potentially confrontational quality of producer-consumer relations: instead, energy trading will increasingly involve a triangular process involving crude producers, refiners, and consumers in complex alliances. Biofuel markets will equally benefit from de-localization, without prejudice to energy security.

CONCLUSION

Record high oil prices and lagging supply growth in the face of booming demand have raised awareness that current rates of oil consumption are unsustainable. Western energy dependence on oil exporters often perceived as undemocratic, inherently unstable, or determined to leverage their oil assets for

maximum gain has fuelled concerns about energy supply security. The massive wealth transfer from oil consumers to producers resulting from the oil trade is causing unease. For all those reasons, homegrown biofuels are increasingly embraced as a panacea allowing consumers to cut their dependence on oil imports without altering consumption patterns. The notion that imported oil can simply be replaced with domestic biofuels give consumers the feeling that they can have their cake and eat it, too—that their energy needs can be met while keeping the money at home. But that supply-side solution to our energy problems is causing problems of its own. In the U.S., run-away corn ethanol production is making growing demands on available corn capacity and farmland. Grain prices are soaring—not just for corn, but also for other grains and agricultural commodities displaced by corn to meet the biofuel industry's surging requirements. Faced with the unintended consequences of biofuel production, consumers are increasingly questioning whether its supposed benefits—economic, environmental, and otherwise—are worth the trouble. U.S. ethanol producers themselves appear on shaky grounds. Tightening credit, surging borrowing, construction and feedstock costs, slowing transportation fuel demand amid weak economic growth and rising fuel prices, and regulatory uncertainty are just some of the challenges facing the burgeoning industry.

While the ethanol and biofuel industries face a growing backlash, one must resist the temptation of overstating the criticism. Biofuels are not the only reason why agricultural and food prices are surging—demographic expansion, rising incomes, and changing food habits in emerging economies are another. So is investors' growing appetite for agricultural commodities—and other commodities—as an asset class and financial hedge against inflation or currency fluctuations. The global agricultural and food industries have inefficiencies of their own that need to be addressed. The challenge of balancing energy supply and demand while combating climate change and environmental degradation is far bigger than the biofuel industry.

It would also be unrealistic to expect the biofuel industry to emerge from scratch as a fool-proof solution to our energy needs. Inefficiencies, misfires, and creative destruction are par for the course for any young industry in its takeoff stage. It is safe to bet that, over time, the nascent biofuel industry will adjust, restructure, and address its shortcomings, as other pioneering industries—high-tech dot-coms yesterday, railways earlier—have done before it. That is happening already. Faced with surging costs, U.S. ethanol companies are cutting back on projects, delaying—permanently?—planned expansions and merging with one another. It is telling that the latest version of the U.S. Renewable Fuel Standard (enshrined in the Energy Security and Independence Act of 2007), under cover of an expanding biofuel mandate, in fact puts a cap on U.S. corn ethanol capacity expansion.

But all those problems and the inevitable painful adjustments facing the biofuel industry could have been greatly minimized by decoupling support for

biofuels and renewables from protectionism and the quest of energy "import independence." The focus on domestic production that still characterizes renewable policy has fostered inefficiencies and side effects that undermine the industry's competitiveness and economic viability and, ultimately, U.S. energy security. While protectionism is inefficient in any sector of the economy, it is particularly punishing in the biofuel sector, because western consumers tend to be at an inherent disadvantage to tropical and subtropical countries when it comes to biofuel production—a disadvantage that subsidies and trade protectionism exacerbate rather than reduce.

Protectionism is bound to be stripped over time from biofuel and energy policy. Two competing—though not exclusive—models may emerge: biofuel producers are likely to go either local or global, not national. In the local model, biofuel producers will be to fuel supply what distributed power is to the electricity market: small plants designed to serve the immediately surrounding market to cut back on transportation losses and costs. In contrast, global producers will look for global market opportunities, seeking cross-border alliances and mergers and aiming to boost profits and cut costs by adjusting trade flows in response to market signals, much as is done in crude and refined products markets.

In the biofuel industry as in the traditional hydrocarbon industry, the challenge of energy scarcity calls for international cooperation and trade integration, not protectionism and isolation. Ultimately, the solution to climate change, resource depletion, and access constraints calls for demand restraint and sweeping efficiency gains, not just a quest to unlock alternate energy supplies. But the looming energy crisis is global, and so must be its solutions. That is especially the case of supply-side measures. Trying to solve the energy crisis country by country only risks making it worse.