

**Statement of John Pierce  
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E.I. DuPont de Nemours and Company, Inc  
Regarding the Renewable Fuels Standard  
before the  
Subcommittee on Clean Air and Nuclear Safety  
Committee on Environment and Public Works  
U.S. Senate  
July 10, 2008**

Good morning Chairman Carper, ranking member Voinovich and members of the committee. My name is John Pierce, and I am the Vice President for Technology for DuPont Applied Biosciences, which includes our biofuels and biomaterials businesses. I am pleased to be here today to discuss the Renewable Fuels Standard. In my testimony I will provide our views of the future of biofuels, and the role of the Renewable Fuels Standard in that future.

DuPont brings a broad perspective to bear on biofuels issues, as we span the biofuels value chain. Our seed business Pioneer Hi-Bred is the world's largest seller of seed corn and the second largest seller of soybean seed to farmers. Our seeds have enabled steadily rising yields, or production per acre, for over 80 years. We sell over 170 corn varieties specifically for ethanol production, varieties that produce high fermentable starch, yielding more gallons of ethanol per acre. With our Partner BP we are developing biobutanol, a higher alcohol fuel produced by fermenting biomass. Biobutanol is more like gasoline than is ethanol, with higher energy density and the ability to be distributed via the existing gasoline infrastructure, including pipelines. Biobutanol also improves ethanol-gasoline blends as a co-blending component. It reduces the volatility of the blend, allowing butanol-ethanol-gasoline blends to be used in the summer season where air quality concerns currently limit the use of ethanol-gasoline blends. And with our partner Genencor we will next year pilot a cellulosic ethanol technology based on corn stover, with commercial quantities produced in 2012. This technology will quickly provide expanded ethanol production from the existing agricultural and biorefinery infrastructure employing a non-food feedstock. We also have biomaterials and food ingredients businesses. Across our entire business portfolio we are experiencing the impacts of rising input prices, from energy to steel to agricultural commodities, and understand the strains they impose. That is why we are producing materials that help to reduce the supply-demand imbalances that contribute to these price rises.

The existing suite of biofuels policies, of which the RFS is a significant component, has been very successful in standing up a US ethanol industry that is making a meaningful contribution to US energy security and the environmental footprint of transportation. We have to remember that we started down the road of alternative transportation fuels because of the variety of security, environmental and economic ramifications of our dependence on petroleum. Those challenges have only grown more acute. And we are

making solid progress. Today, ethanol production in the US offsets over 7 billion gallons of petroleum demand. A recent analysis from Iowa State University estimates that the presence of ethanol in the US fuel pool is lowering gasoline prices on the order of 25 to 40 cents per gallon. That is a significant savings for American consumers and businesses. Because energy costs are also a major element of manufacturing costs this is also helping to restrain inflationary pressures.

### The Role of Biofuels

We believe that biofuels can serve an expanded role in fueling transportation in the US and elsewhere while contributing to reducing the carbon intensity of transportation. We also believe this can be done without increasing the environmental footprint of the agricultural enterprise. Steadily increasing agricultural productivity, which we are helping to achieve, and the use of non-food feedstocks, such as cellulose, to produce biofuels are important to this future. Ensuring a viable biofuels market will be critical to ensuring the substantial private sector investments that are required to bring these second generation biofuels technologies to market in the next several years.

Why are we bullish on biofuels? First, because we see agricultural productivity as an engine that can provide abundant food, feed, fuel and materials globally. And second because we see the promise of next generation biofuels technologies to expand upon the solid foundation we have built on grain based ethanol. DuPont and BP will be producing biobutanol at pilot scale in 2010 and commercial scale in 2012. We have already performed fleet testing and are on track to bring to market a biofuel that is completely compatible with the existing petroleum infrastructure, has high energy density and thus good fuel mileage, and improves ethanol-gasoline blends. Next year our joint venture with Genencor will start up a pilot plant producing ethanol from corn stover, which is the cob, stalk and leaves of the corn plant, with commercial production in 2012. This fuel will have a carbon improvement over gasoline on the order of 80 to 90%.

Why corn stover? Because it capitalizes on the existing infrastructure to provide rapid expansion in ethanol production with no potential competition for food and feed uses of corn. The same equipment that goes into the field to harvest corn grain for ethanol will harvest an appropriate amount of stover, leaving behind enough for soil conditioning and erosion control. The stover will be transported to an existing biorefinery where it will be fed to a parallel processing and fermentation unit integrated with the existing facility. The result will be a 25-30% increase in ethanol production from the existing acreage. The stover from corn fields that are currently producing for food and feed uses will be able to produce additional biofuels volumes, further expanding the ability of agriculture to produce food, feed and fuel. While other cellulosic feedstocks have promise, and we are working on them as well, corn stover offers the most rapid deployment.

### The Role of Agricultural Productivity

As for agricultural productivity, the US has a long track record of continually expanding production from the existing agricultural acreage, and producing a wide variety of

products for food, feed, fuel, and industrial uses. At the turn of the 20<sup>th</sup> century, 25% of all energy used in the US came from burning wood, and in 1915, some 90 million acres of US cropland were used to grow feed for horses and mules – our transportation at that time. A major, new innovation of the last century was to learn to use fossil fuel based sources for our transportation, energy, and material needs. While hugely transformational for the world's economy, limitations of our dependency on fossil fuels are increasingly apparent. Concurrently with the huge transition to this fossil based economy, agricultural productivity also increased by leaps and bounds. When our Pioneer subsidiary began operations in 1926, corn yields were about 27 bushels per acre and petroleum was relatively cheap – you could buy 3.5 pounds of petroleum for the cost of one pound of corn. Today, corn yields in the US average about 150 bushels per acre. Corn, at \$7/bushel, is 3.5 times cheaper than petroleum, instead of being 3.5 times more expensive as it was in 1926 – a remarkable testament to agricultural productivity.

Agricultural yield and productivity has steadily increased in the US, with notable gains in a few other areas of the world, allowing significantly expanded production from the same acreage (see exhibit 1). In the last 25 years improved corn yields from existing acres in the US have resulted in corn production that would have required an additional 150 million planted acres had yields not steadily improved. In essence, better yield has created 150 million “virtual acres”, about the amount of planted land in the US today. In the last ten years global soybean production has increased 56% and corn production has increased 32%, while the total acres of land used for such production has increased only 6% (see exhibit 2). Such is the power of agricultural yields. This has come from steadily improving plant varieties that produce more, require less inputs and are less susceptible to insects, disease and weather variations. For example, in 1983, 1988 and 1994 the US experienced droughts that reduced average corn yield 25-30%. In the 2003 drought the yield declined only about 7%. So we are seeing higher upside and lower downside in agricultural production. Further, we expect within the next ten years to see a further 40% increase in this rate of annual gain. In 1985 average corn yield in the US was about 100 bushels per acre. In 1995 that value was 130 bushels per acre, and in 2005 it was 150 bushels per acre. We think 2020 will see average yields of 200 bushels per acre (see exhibit 3). This enhanced productivity from existing acreage with more efficient use of inputs such as water, fertilizer and crop protection chemicals also contributes to more sustainable agriculture.

However, much of the rest of the world lags US productivity by large margins, even after significant gains in some regions. In the last ten years Brazil has increased its corn yields by 50% and South Africa almost 70%, yet they still have yields less than half of those in the US, as do South and East Asia (see exhibit 4). This means that there are dramatic opportunities to expand global agricultural production from existing acreage by bringing modern farming practices to other parts of the world (see exhibit 5). This is why we believe that agriculture can continue to provide for our food, feed, fiber and fuel needs.

## The RFS

Now let me turn my attention to some of the specifics of the Renewable Fuels Standard. As the RFS was developed we encouraged Congress to emphasize policies that were feedstock, technology and fuel type neutral, and to focus on desired fuel attributes such as energy density, low carbon content and infrastructure compatibility. The RFS provisions enacted last year made significant steps in this direction, and are helping to motivate the right kinds of market transitions. In fact, there are multiple technology developers intending to produce cellulosic ethanol in pilot or demonstration quantities from a range of feedstocks over the next 24 months. The economics and carbon performance of grain ethanol continues to improve as well, as does agricultural productivity and sustainability in the US. These trends suggest that while the RFS targets are aggressive, as they should be, they are not out of reach. The integrated strategy of the U.S. is exemplified by the RFS and the related investment strategies of US DOE and USDA, which have supported a variety of alternative fuels technologies. As a result, numerous companies and institutions are now involved in biofuels work looking at a variety of different technologies, approaches, and feedstocks, and we can confidently look to US-derived technology to make the seminal contributions to renewable fuels.

We would like to see biofuels policies continue to evolve to be more performance based, to provide the right market signals for the production and use of fuels with the most beneficial attributes. For example, a low carbon fuel standard would create incentives for a fuel blender to purchase biofuels with the lowest life cycle carbon content. That would create greater market value for such low carbon fuels, and thus market incentives for fuel producers to develop the lowest carbon biofuels. Single value threshold carbon standards, such as a minimum percentage improvement over gasoline in life-cycle carbon content, run the risk of blunting that market signal. If biofuels producers don't see higher market value for fuels with better carbon performance than a bright line standard they will be less likely to develop such fuels. A low carbon fuel standard or other "sliding scale" approach better incents the market to produce the best fuels possible. However, we recognize that having an efficient and functional low carbon fuel standard will require streamlined and standardized life cycle assessment tools that are not yet available, which I will return to in a minute.

Comment [JP1]:

We also think it is in the national interest to help further accelerate the development of cellulosic biofuels. There are a number of things Congress can do in this regard. You can help to ease the financing risk of new biorefineries, such as through loan guarantees and accelerated depreciation. There is also a significant need to develop the know how and infrastructure for growing, harvesting, transporting, storing and processing cellulosic feedstocks, as this remains one of the least developed areas for this emerging technology. The Farm Bill made progress in these areas. Continued federal encouragement to growers and further R&D attention to cellulosic feedstocks would be very beneficial.

That being said, we think the current policy framework provides a sound basis and is helping to develop a robust biofuels industry. We look forward to continuing to work with Congress to improve this framework over time while avoiding sudden changes that

would disrupt our path to broader use of biofuels. However, there are some potential storm clouds on the horizon.

### Biofuels Sustainability

One of the benefits of, and appropriate goals for, biofuels is enhanced sustainability, including a lower carbon footprint, than the incumbent hydrocarbon fuels. Given the nature of the biofuels value chain it is important that we consider the carbon ramifications of the various elements of that value chain, from the production of feedstock through their harvest and transportation through the biorefinery process. This is typically done through life cycle modeling, which is an area under rapid development and where common methodologies have not yet emerged. We will have to get to standardized and streamlined life cycle tools before we can fully utilize the market power of something like a low carbon fuels standard. The US currently consumes almost 150 billion gallons of gasoline a year, a staggering amount. As biofuels become an increasingly prominent part of that fuel pool, it will mean many, many batches of biofuels from many, many producers. Current life-cycle tools are quite complex, and can look more like a mini-PhD thesis than the kind of real-time tool that will be necessary for evaluating and certifying these batches of biofuels. The tool will also have to allow for ready differentiation amongst fuels on things like carbon content so fuel producers can capture value for fuels with better attributes.

Of course, the implementation of a coherent market based carbon reduction program, such as cap and trade, for fossil-based carbon emissions provides perhaps the most straightforward way to accomplish the goals of reducing fossil CO<sub>2</sub> emissions in that it would incent all users of fossil-based fuels – including biofuels producers – to find ways to lower their fossil CO<sub>2</sub> footprint.

Congress has tasked EPA with making life cycle analysis considerations at a broad policy level as it implements the “RFS II”, including the consideration of what are termed indirect land use effects. These are land use changes that are not directly attributed to the production of biofuels feedstocks but that in some manner can be inferred to be indirectly attributed.

What is well known is that converting certain kinds of ecosystems to agricultural or other use, such as tropical forests and peat bogs, can release significant amounts of stored carbon and reduce future carbon storage potential, as well as reducing habitat and having other deleterious effects. We have, for example, seen such effects in parts of Southeast Asia where forests have been felled for logging as well as for palm oil monoculture. What is much less understood is the potential for expanded agricultural production to more generically result in such land use changes, which are second, third or even fourth order effects. There are multiple factors that influence land use – human population growth, rising standards of living, traditional subsistence farming practices, global demand for timber and minerals, etc. The role of agricultural production in motivating such land use changes is an area of much speculation, including speculations from some recently publicized analyses and media stories, but very little real knowledge. While we

think that understanding the negative aspects of inappropriate disturbance of these most sensitive ecosystems provides a cautionary tale of how to regulate land use and how not to produce timber, biofuels feedstocks, and other agricultural commodities, we do not see such outcomes as either desired or inevitable in our future.

It appears that EPA intends to apply potential indirect effects of biofuels feedstocks production generically to biofuels. In large measure this is due to the significant difficulty of relating a particular feedstocks production to land use changes that might occur thousands of miles away. This approach could result in some sort of generic carbon “penalty” being applied to biofuels. We are concerned that this generic carbon penalty, by discounting the actual carbon performance of a given fuel batch, could serve to mute the market signal that properly constructed policy would send to encourage the production and consumption of the lowest life-cycle carbon fuels. We think that considerations of directly attributable land use changes should be included in the life cycle considerations of particular fuels, and that the potential for indirect land use changes are best controlled through other policies that more directly address and prevent deleterious changes.

We would also caution that biofuels feedstocks are only one market for agricultural products. Farmers do not grow just for the food, feed, materials, or fuel markets. They grow-and have always grown- crops that serve all of these markets. If we begin to set standards for agricultural practices for biofuels feedstocks that differ from those for agriculture generally we run the risk of balkanizing agricultural production, and in the process creating disincentives for production for certain end uses. It would be like establishing different mail delivery standards for every tenth house on a mail route. Continually improving the sustainability of agriculture is important, and we are seeing steady improvements in agricultural practices, hardier plants, and lower inputs such as water and fertilizer. We should continue to advance the sustainability of agriculture as a whole, and not fall prey to multiple and potentially conflicting sustainability standards for crops going into different end uses. The end uses may be different, but the crops and the growing are the same.

Another area where caution is warranted is the current attribution by some of rising global commodity prices, particularly food commodity prices, to ethanol driven corn demand, and the resulting suggestion that the RFS be stalled or decreased. Many others have noted the variety of factors that have caused the prices of a wide variety of commodities, from steel and copper to cement, energy and, yes, grains to rise. Prices for foods derived from wheat, corn, and rice have all risen over a similar period, though these crops have dramatically different food, feed, and fuel uses. The primary drivers for these price increases can be found in higher demand resulting from population growth, higher per capita income and rising standards of living, and overall higher fossil fuel energy costs. I would simply observe that in 2008 ethanol production in the US is anticipated to consume about 19% of US corn production, which is about 10% of global corn production. Corn into animal feed, including exports (17% of production), will consume 70% of US production (taking into account the ethanol co-product DDG that goes back into animal feed). Direct food uses comprise the other 11%. In 2007, when ethanol

production consumed about a quarter of the US corn crop, the US had its largest corn export volumes ever, and we finished the year with unused corn stocks. The market has not been short on corn

Rising global food prices are a real and important concern, particularly in the developing world where food can be a very significant portion of a family budget. Agriculture and associated advances in processing technologies can supply the solutions, providing adequate resources for food, feed, materials, and fuel far into a sustainable future – just as they have done for as far back as we care to look. Slowing US biofuels production is not the solution. Let's not take actions that will do nothing to solve food price inflation but will certainly harm the advancement of next generation biofuels. Let us instead continue to expand agricultural production from the world's existing farm acreage, a goal we are already addressing and which we can readily accomplish.

Thank you for the opportunity to speak with you today on this important topic, and I look forward to your questions.