



To: The Office of Science and Technology Policy

The United States soybean industry, representing more than 600,000 U.S. soybean farmers, welcomes the opportunity to provide comments to be considered as you develop a blueprint for a new National Bioeconomy.

Since humans first settled in what is now the United States more than 15,000 years ago, the “economy” has been a *bioeconomy*. We harvested and traded wild-caught or farmed food and fiber, tools and fuel. What has changed over the past century is the efficiency of production systems necessary to fill the needs of a burgeoning global population while conserving limited natural resources.

With one outstanding exception – seafood -- our food is no longer wild-caught. Aquaculture provides a unique challenge and opportunity within the NEW U.S. *bioeconomy*. Below we outline the strategies for overcoming hurdles to an economically and environmentally sustainable aquaculture industry for domestic use and export that will both generate jobs and develop innovative technology.

*1. Commercialization and entrepreneurship opportunities to open new markets;*

The trade deficit attributable to seafood is \$9 billion, which in terms of natural resources is second only to crude oil. More than anything else we eat, our seafood has traveled a long way - 84% is imported. Still, we eat half as much seafood as USDA recommends and research on the health benefits of long chain omega-3 fatty acids continues to emerge. While global production of fish from aquaculture grew more than 60 percent between 2000 and 2008, production in the U.S. remains stagnant.

As wild fish stocks continue to decline, there are myriad opportunities: for rural communities with long traditions of harvesting seafood (see for example developments in [Maine](#)); to repurpose or upgrade production systems for parts of the existing industry; to develop incentives for locally raised fresh fish production; and to expand demand for new products such as algae and co-products biofuel production that have the potential to be used as feed stocks.

*2. Research and development investments in areas that will provide the foundation for the bioeconomy;*

There are unique opportunities in aquaculture to apply advances in genomics and computational biology. Plant science research in the U.S. has been well-coordinated, but animal agriculture trails and the basic understanding of the interaction between plants and animals - nutrition - has scarcely begun. This is despite the fact that the economic and environmental sustainability of livestock production depends on efficient feeding.

Technological barriers (or conversely – opportunities) have been [documented](#) and vetted by [DOC \(NIST and NOAA\)](#). Innovation in production systems and fish nutrition presents many opportunities for exporting feedstocks, genetics and technology. But this improved understanding will also enable

producers in developing countries to use local crops to feed local species of fish – and seafood is a critically important source of protein in the developing world.

Research programs are already in place at NIH, NSF and USDA. Program managers just need to be given the impetus to develop “calls” for the interdisciplinary, innovative research needed to catalyze and focus innovation.

3. *Enhancements of workforce training to prepare the next generation of scientists and engineers for the bioeconomy jobs of the future;*

Historically, agricultural research in the United States has not been considered sexy science. But concerns about food shortages, land use, climate change and biodiversity have created a huge need for interdisciplinary researchers to use biotechnology to focus on agriculture. Delivering the dramatic increases in crop yields needed to feed 9 billion people by 2050 — without increasing greenhouse-gas emissions or encroaching on land needed to maintain biodiversity — is a daunting challenge that transcends disciplines and includes genomics, nanotechnology and soil microbiology.

But modern, technically sophisticated aquaculture also requires skilled workers to manage and operate facilities and trained scientists to staff research laboratories. There are opportunities to develop non-degree technical programs imparting the practical skills desired for employment at aquaculture production facilities.

4. *Regulatory reforms that will reduce unnecessary burdens and impediments while protecting health and safety, and the environment.*

The process of obtaining approvals and permits for coastal aquaculture projects is the major impediment to the development of marine aquaculture in the United States. Permits from a spectrum of federal, state, and local agencies remains an uncertain, uncoordinated, unstable, and inconsistent process. There are constraints on siting that limit the expansion of shellfish aquaculture, particularly for small-scale producers. Legislation that would have streamlined the permitting process for federal waters has not advanced.

Technologies are available to monitor aquaculture operations as the basis for science-based regulations and to make the information available to the public on an ongoing basis. Environmental monitoring is expensive, however, and presents an opportunity for the public sector to partner with the private sector to provide the information the public demands.

5. *Public-private partnerships to accelerate innovation in key areas.*

Achieving the economic and environmental sustainability that would allow development and expansion of aquaculture in the U.S. depends primarily on continued commitments by government to provide a regulatory framework and strategic research investments. The U.S. soybean industry continues to use significant farmer dollars to work closely with NOAA and USDA to develop highly efficient alternatives to fishmeal and oil, the historical basis of formulated aquaculture feed. While we continue to work overseas to introduce aquaculture producers to soy-based aquaculture feeds and to expand the export of U.S. soybeans, we lament the significant opportunities to work within the U.S. to expand the supply of domestically produced seafood – and the jobs that will come with it.

There are many important opportunities to use biotechnology to optimize the efficiency and sustainability of U.S. soy production as global demand for soy for food and feed rises and soy becomes increasingly [competitive with petroleum-based feedstocks](#). But, we consider expanding the U.S. aquaculture industry a uniquely exciting opportunity to focus the advances in biotechnology on a food production system that is growing globally, but not in the U.S. A vibrant domestic aquaculture industry

has the potential to provide health benefits as well as demand for co-products of biobased fuel production.

We welcome the opportunity to discuss these comments in more detail. Thank you for considering them.

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Alan Kemper, President  
American Soybean Association

A handwritten signature in black ink that reads "Marc S. Curtis". The signature is written in a cursive style with a long horizontal stroke at the end.

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Marc Curtis, Chair  
United Soybean Board