



SUSTAINABLE

— A M E R I C A —

INCREASING FOOD AVAILABILITY TO ENSURE A RESILIENT FOOD FUTURE FOR AMERICA:

SUSTAINABLE AMERICA'S POSITION ON FOOD

The United States sits at a critical juncture at which its food and fuel systems are running at a high utilization rate with little spare capacity, putting the nation and everyday Americans at risk of price increases and physical shortages of two of our most basic necessities. Complicating matters are the increasing linkages of our food and fuel markets, through the mechanisms of corn-based ethanol and oil usage in the food system. On a global scale, the food system is also strained as calorie demand grows in step with population growth and is exacerbated by the growing wealth in emerging economies, meaning that large segments of the American population, as well as the global population, live in a state of food insecurity. Sustainable America's goal is to increase the availability of food to meet rising demand through the reduction of food waste and by increasing food production at the industrial and alternative farming levels. Sustainable America seeks to increase food availability by 50% between today and 2035.

This paper aims to explain Sustainable America's position on Food. An earlier paper examines the role of Transportation Fuels in the Food/Fuel nexus in more depth.

THE PROBLEM

Our global food system is operating above capacity¹, while demand for calories continues to grow. As a result, tightened supplies have led to price increases in recent years, and long-term prices of cereals for 2008-2017 are forecast to be 50% above average nominal prices for the 2000-2007 period². With higher prices comes an increased pressure on food budgets, and increasingly large portions of the global population now live in a state of food insecurity.

FOOD AVAILABILITY: HOW TO FEED 7+ BILLION

Population Trends Drive Increased Demand, Increased Food

Insecurity. As the global population surges from 7 billion (2012)³ to 9 billion in 2035 (UN estimates range from 8 to 10 billion)⁴, the amount of food needed to feed people will grow from approximately 20 trillion calories per day to 23 trillion calories per day⁵. An increased per capita demand for meat, dairy and other proteins from the growing middle and upper classes in emerging market nations will add an additional 2 trillion calories per day. This 25% increase in caloric demand from 2012 to 2035 will further strain already stressed food systems.

Already, we're able to see the strain on the food system and food prices here in the United States, as reflected by the nearly 50 million Americans living in a state of food insecurity, meaning that they cannot always meet their basic food needs. High food prices put a particular strain on lower income groups, which must devote approximately 37% of income to food and fuel purchases⁶.

Living on a Thin Margin: Production Capacity Grows Slowly,

Stocks Dwindle. While food consumption continues to grow, food production remains only marginally ahead of demand, leading to a broad drawdown in key food stocks. Trends show that food production has risen, but faces many challenges in the future stemming from the availability of arable land, questions over whether crop yields can continue to grow, and increasingly unpredictable and extreme weather. Although world grain production was up markedly in the 2011/12 crop year, consumption continues to rise virtually in lock-step. The following chart shows grain yields have been increasing to keep slightly ahead of population growth⁷. Sustainable America intends to work with entrepreneurs to help make sure that this trend can continue.

¹ Food and Agriculture Organization of the U.N.; International Institute for Applied Systems Analysis

² Bridgespan Group analysis

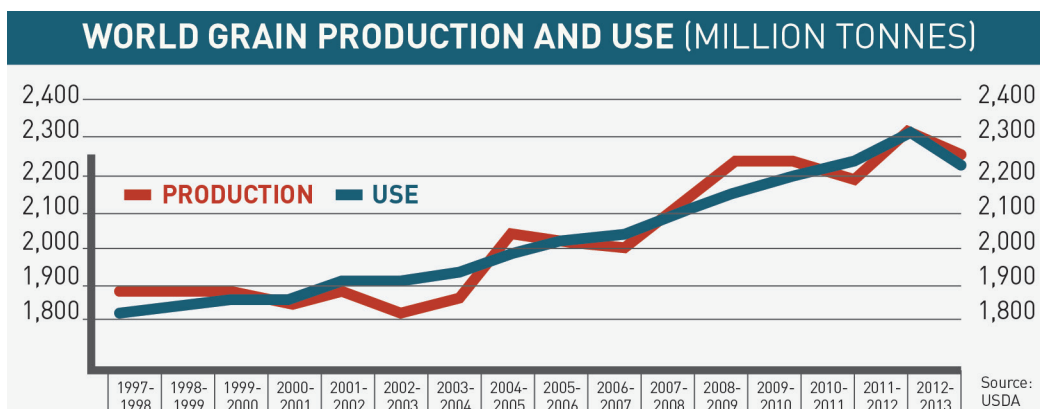
³ US Census Bureau

⁴ UN World Population Division

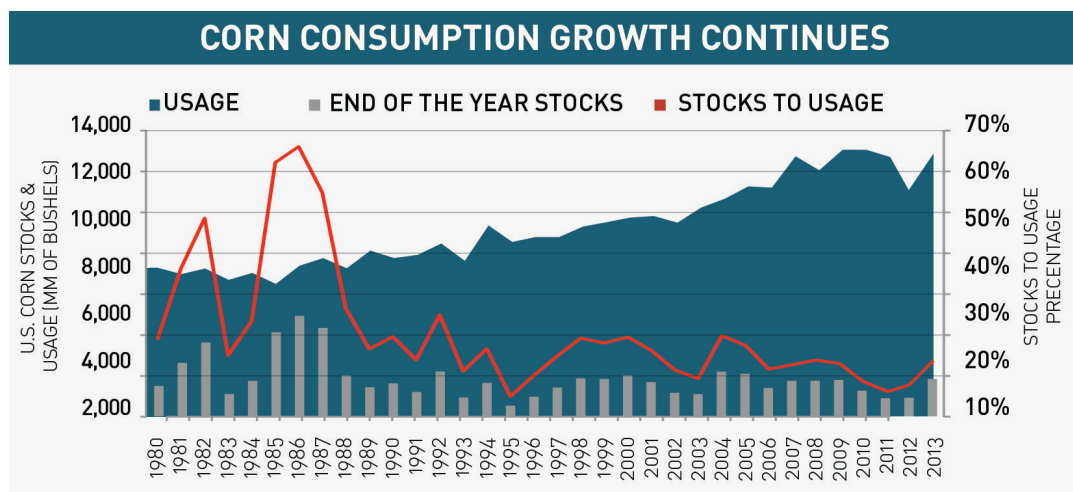
⁵ Bridgespan Group and Sustainable America estimate, based on data and projections from the Food and Agriculture Organization of the UN, and the International Institute for Applied Sciences.

⁶ Bureau of Labor Statistics Consumer Expenditure Survey, 2010; Census Bureau; Peterson Institute

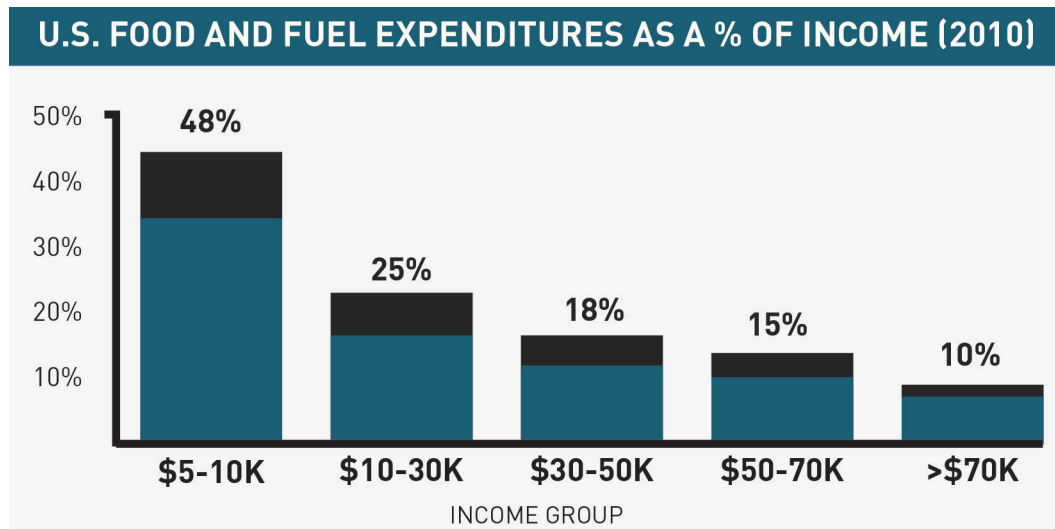
⁷ Pottorf, Richard. Doane Agricultural Services, 2012, and USDA data, 2013



The graph below captures the broad picture of the grain market in the United States, demonstrating that end of year stocks have fallen from much higher levels in the 1980s, and that the ratio of stocks to usage is historically low, making the current system quite fragile. The rise in corn usage from 2006 onwards in the U.S. is exacerbated by the use of corn-based ethanol in our gasoline supply (more on that subject follows). A large corn crop in the 2012/13 crop year improved end-of-year stocks in the U.S., pushing stocks-to-usage into the 20%-30% range, which held for much of the 1990-2010 period. Rising consumption is likely to keep pressure on this metric. Globally, the picture looks similar, but due more to population growth and wealth creation in emerging markets.



2012 – A Year of Extremes. Sustainable America has identified several factors that exacerbate the difficulty of increasing the nation’s capacity to grow more food. Among them are adverse weather, including drought; soil degradation from industrialized agriculture and mono-cropping; and the significant portions of arable land used for biofuels production. The year 2012 was, in retrospect, a very succinct lens through which to view some of these factors. For example, U.S. government weather data shows that 2012 was the hottest year on record⁸. Drought conditions affected more than half of the country, with over 62% of the contiguous U.S. experiencing drought conditions in November, affecting at least 49 percent of the corn crop, 50 percent of the soybean crop, and 45 percent of the hay crop⁹, and potentially costing a record \$15 billion in crop insurance claims.¹⁰ These factors in turn drove up both food and gasoline prices due to the linkages of the food and fuel markets through the use of corn-based ethanol.



⁸ NOAA

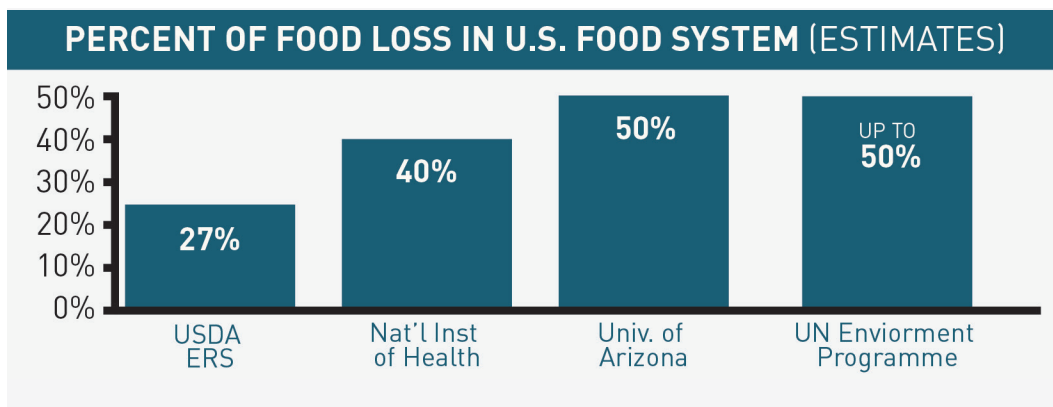
⁹ NOAA, USDA

¹⁰ Reuters, 10/17/12, citing agricultural economists at Montana and Illinois Universities and the catastrophe modeling company AIR Worldwide

Ethanol, a topic that received heightened media coverage in 2012 because of the drought, further intensifies the linkage between the food and fuel systems. Due in part to the demand created by federal mandates, 45% of the U.S. corn crop was used to produce ethanol in 2011 – more than is now directly used for animal feed, seed and other uses¹¹. American corn farmers have become partially reliant on selling an increasing portion of their crops to ethanol producers, and the demand for ethanol has pushed corn and farmland prices upwards across the board. At the same time, the oil refineries that turn crude oil into gasoline have also become reliant on corn and ethanol. Refineries, which are multi-billion dollar facilities, once had to re-engineer their operations to accommodate ethanol blending and couldn't undo it today without billions more dollars spent in re-engineering costs. Ethanol is now a must-run fuel in an industry that is critical to daily American life, with 10% of each gallon of gasoline comprised of ethanol. To the American consumer, the linkages of the oil and food systems will now inexorably result in higher food and gasoline prices at any juncture when there is a corn shortage.

FOOD WASTE: A PROBLEM WE CANNOT IGNORE

Food Waste – Unsustainable by Any Measure. America's food waste problem is out of control, with waste estimates ranging between 27% and 50% of food produced. To compound the problem, a recent study showed that roughly two-thirds of food waste goes to the landfill, leaving only one-third diverted to other useful purposes such as composting, energy and fuels generation, animal feed, and redistribution to people.¹² Digging deeper into the statistics renders yet a more startling picture: While diverting food waste to compost and animal feed are worthwhile endeavors, only about 1% of food waste generated makes it to the food banks, soup kitchens and shelters that distribute food to Americans in need.¹³ Likewise, only between 2% and 6% of food waste is composted or recycled, compared with 62% of paper, meaning that potentially rich soil amendments which could help grow more food are not utilized. Despite the scope of the food waste problem, it is one of the most obvious places for those concerned about food availability and food insecurity to begin, as a reduction in waste contributes immediately to available calories, even under current food production constraints. Using the success of paper recycling as an analogy, we have hope that Americans, if educated about the importance of reducing food waste and motivated to change, can make huge strides in a fairly short amount of time.



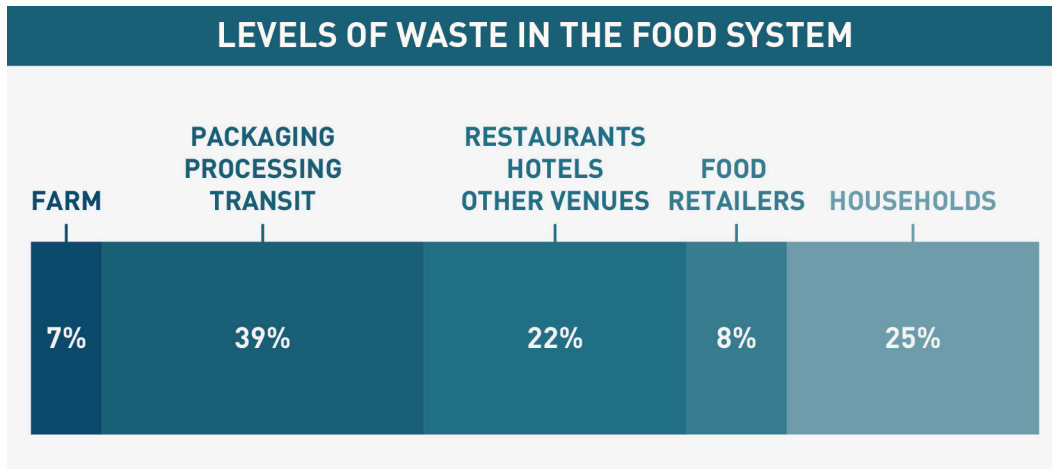
¹¹ USDA data. A portion of the waste from the ethanol process is converted to dry distillers grains that is returned to the market as animal feed.

¹² Food Waste Reduction Alliance

¹³ ibid

America's food waste problem exists at all levels of the food system, from farmer to consumer. A snapshot of food waste provides some examples:

- **At the farm** – Between 7% and 10% of the total food produced in the United States never leaves the farm, left either unharvested or unsold by the farmer¹⁴, typically due to a lack of demand (difficulty determining ahead of time how much of each crop to grow based on forecasts of the market), and sometimes due to adverse weather's detrimental effect on a given crop (crop dies in the field or on the vine, so to speak).
- **Packaging, processing, and transit** – this level of the food system, largely invisible to the wider public, is where a large portion of our food waste is generated (up to 39% of food waste generated)¹⁵, whether through breakage or spoilage at a processing plant, or as the food makes its way on planes, trains, and trucks to stores and restaurants.
- **Restaurants, hotels, entertainment venues** and other businesses where food is served also generate large amounts of food waste, between 22% and 33% of total waste.¹⁶
- **Food retailers**, such as grocery stores, generated between 8% and 11% of our total food waste due to spoilage, disposal of products that sit on shelves past their “sell by” dates, and produce that is passed over by consumers because it may not be pleasing to the eye (too small, misshapen, etc).
- **Households** are a large generator of food waste, potentially generating up to 25% of all food wasted in the United States¹⁷, largely due to spoiled produce, fish and meat products, as well as uneaten prepared meals.



Sustainable America is seeking to add its resources and efforts to those of several organizations and entrepreneurs currently seeking to tackle such a monumental problem. If we assume a 33% food waste metric, our goal is to roughly cut that percentage in half, to 17% by 2035, to help increase food availability in the United States. While the United States government has not set out a goal to curb food waste, Sustainable America's goal for the U.S. is similar in scope to the goal that the European Union set for its member states.

¹⁴ Sustainable America estimates, Feeding America

¹⁵ Sustainable America estimate

¹⁶ Sustainable America, Food Waste Reduction Alliance

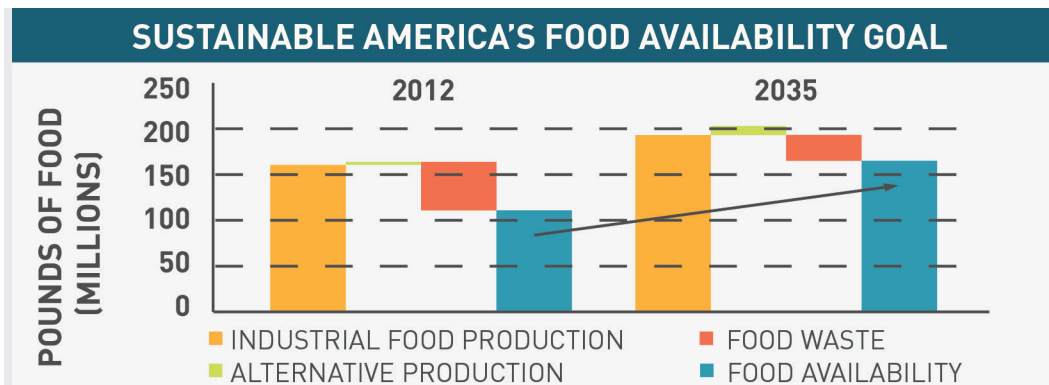
¹⁷ Bloom, J.

THERE ARE SOLUTIONS

Sustainable America believes that the best way to generate hope is by taking action, and that several solutions to increasing our food availability are within reach. Our goal of increasing food availability by 50% between 2012 and 2035 can be met with a multi-strategy approach that includes increased industrial food production, increased production from alternative farming methods, and decreased food waste. There are hurdles to all of our proposed solutions, but knowledge and practical action can overcome the majority of them.

SUSTAINABLE AMERICA'S THREE MAJOR FOCUS AREAS FOR INCREASING FOOD AVAILABILITY BY 2035:

- *Increase industrial food production by 25%*
- *Triple food produced via alternative farming methods*
- *Decrease food waste from 33% of total food produced to 17% of food produced*



INDUSTRIAL FOOD PRODUCTION: INCREASE BY 25% THROUGH INCREASED EFFICIENCY

Industrial farming accounts for between 96% and 99% of total agricultural production in the United States, and thus remains critical to the present and future of American and global food supplies.

While consumer interest in local and organic farming is growing, local and other alternative farming methods alone cannot deliver the scale necessary to accommodate the growing need for calories, either domestically or globally, meaning that industrial

farming will continue to have a place as the major source of food for the planet. While crop yields in the United States have grown in the last decade, that trend may not be sustainable, while devoting new areas of land to crops may mean moving further into marginally productive farmland and climates. Thus, Sustainable America believes that several areas are ripe to improve crop yields, as well as soil health and crop diversity, which helps to make our food supply more resilient in the face of drought, pests, and crop diseases.

Precision agriculture, loosely defined, is an area in which we see great promise for improving crop yields, while also making farming more efficient. Precision agriculture seeks to use new technologies, such as GPS devices and precise measurement systems, to increase crop yields and profitability while lowering the levels of traditional inputs needed to grow crops (land, water, fertilizer, herbicides and insecticides).

Some examples of precision agriculture include the installation of GPS devices on tractors, which allows farmers to plant crops in more efficient patterns and proceed from point A to point B with more precision, saving time and fuel. The laser leveling of fields means water can be applied more efficiently, with less water lost to runoff and less farm effluent such as fertilizer running off into local streams and rivers. The precision application of pesticides and herbicides with more advanced equipment helps prevent over-saturation and soil degradation. We are also examining the potential benefits of mixing precision agriculture concepts with traditional organic farming techniques (“Marsden process”), where mono-cropping is swapped out for strategically planned crop rotation and fertilization schemes, which enhances soil health and maintains crop yields competitive with modern industrial farming¹⁸.

LOCAL AND ALTERNATIVE FARMING: TRIPLE FOOD PRODUCTION

Local and alternative farming methods increase crop diversity and resiliency, create jobs, and reduce energy usage in the transportation of food. There is ample room to increase local farming and alternative farming methods, particularly on terrain unsuited to industrial farming and in urban/suburban areas. Only about 3% of current total food production in the U.S. is from alternative methods. Alternative farming creates 13 jobs versus three created in industrial farming for every \$1 million¹⁹ in revenue, and it improves our ability to withstand potential shortages by diversifying the food supply.

Our Proposed Solutions include:

- **Supporting entrepreneurs** seeking to develop commercial-scale alternative farming efforts, including farming in urban areas, vertical farming in urban areas, hydroponics and traditional local organic farming.
- **Fostering the development of consumer markets** (household, retail outlets and restaurants) to support local and alternative farming efforts.
- **Developing enterprises** that seek to alleviate supply chain and distribution bottlenecks in the local farming / local eating system.

¹⁸ Sustainable America, blog
11/5/12

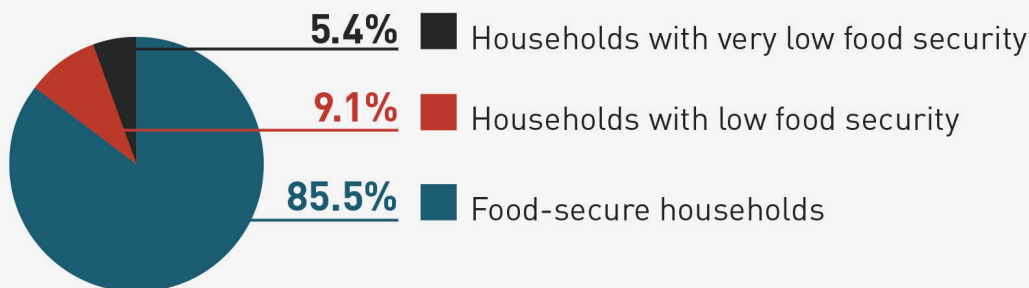
¹⁹ “Comparing the Size, Structure and Performance of Local and Mainstream Food Supply Chains”, USDA ERS, 2010; “Local Food Systems: Concepts, Impacts and Issues”, USDA ERS, May 2010

America's food waste problem is out of control, with waste estimates ranging between 27% and 50% of food produced. A reduction in waste contributes immediately to available calories under current production parameters. Sustainable America's goal is to decrease food waste from 33% of total food produced to 17% of food produced by 2035.

Our Proposed Solutions include:

- **Funding entrepreneurs** seeking to address food waste problems at all levels, with emphasis on waste at the farm, during transportation and during storage.
- **Encouraging composting** and other methods that seek to return biodegradable nutrients back to the soil, enriching the soil for food growth, rather than sending it to landfills.
- **Working with retailers** to help consumers understand food labeling and other efforts to reduce waste at the retail level.
- **Educating consumers** on buying habits, food storage and composting.

ALMOST 50M AMERICANS LIVE IN FOOD-INSECURE HOUSEHOLDS



OTHER SOLUTIONS: LIMITING THE NEXUS OF FOOD AND FUEL

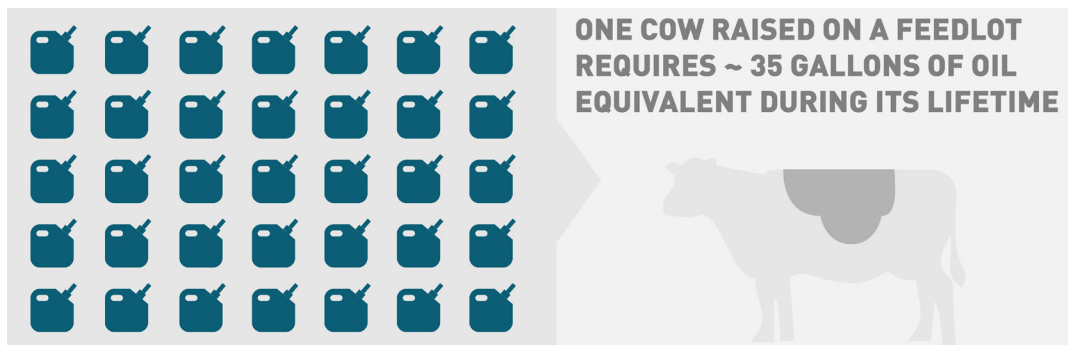
Sustainable America's concurrent goal is to reduce the nation's reliance on oil See Sustainable America's white paper "Breaking America's Addiction to Oil & Fostering an Age of Energy Independence". To that end, a reduction in oil usage, both on the national level and in the food production chain, can have a springboard effect on food availability.

Energy Inefficiency in the Industrial Food System

- Industrial farming accounts for between 96% and 99% of total agricultural production, but uses immense quantities of oil, contributing to the problem. Industrial food production accounted for almost 16% of U.S. energy usage in 2007.²⁰ Noted author Michael Pollan famously claimed that it takes approximately 35 gallons of oil equivalent to grow one cow, when taking all related inputs into account.²¹

²⁰ "Fuel for Food: Energy Use in the U.S. Food System", USDA ERS, 2010; Energy Use in Agriculture", USDA, 2005

²¹ Michael Pollan, Omnivore's Dilemma



- Imported food, often necessary to provide American consumers with food products that would otherwise be out of season (such as strawberries in winter), may travel as many as 5,000 miles to reach U.S. stores.
- The increasing amount of farmland dedicated to growing corn for first-generation ethanol reduces land theoretically available to produce crops for human consumption and animal feed.

Our Proposed Solutions include:

- **Supporting ventures** that seek to improve energy efficiency at the farm level, including efforts like precision agriculture, which should lead to lower oil consumption per acre of crops.
- **Supporting alternative farming** ventures that minimize energy inputs and local farming efforts that minimize the distances food travels to market.
- **Fostering the development of technologies** and businesses that seek to alleviate inefficiencies in the supply chain of industrial farming and distribution.
- **Funding entrepreneurs** dedicated to the development and adoption of advanced biofuels grown from algae or agricultural byproducts (corn stover, switchgrass, etc).

Sustainable America is concerned with increasing food availability and making our food systems in America more resilient to price shocks, severe weather and other unforeseen events in the future. We believe that with focused and concerted efforts, we can simultaneously increase food production and decrease food waste to create a more sustainable America into the future.