USDA
U.S. DEPARTMENT OF AGRICULTURE

2020

Agriculture Innovation Agenda: Scoreboard Report

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INTRODUCTION

The Agriculture Innovation Agenda (AIA) is a department-wide effort to align USDA's resources, programs, and research to provide farmers with the tools they need and to position American agriculture as a leader in the effort to meet the food, fiber, fuel, feed, and climate demands of the future. The objectives of the AIA are to stimulate innovation and to work toward the shared goal of increasing U.S. agricultural production by 40 percent while cutting the environmental footprint of U.S. agriculture in half by 2050. The AIA sets meaningful targets that can be tracked over time to assess progress in the areas of productivity, food loss and waste, water quality, greenhouse gases and carbon sequestration, and renewable energy. USDA has outlined benchmarks to assess progress towards each of the AIA goals. The purpose of the Scoreboard report is to identify the set of key indicators for each of the AIA goals. This initial Scoreboard report presents the base conditions for the benchmarks and metrics that will be used to assess AIA progress in the future.

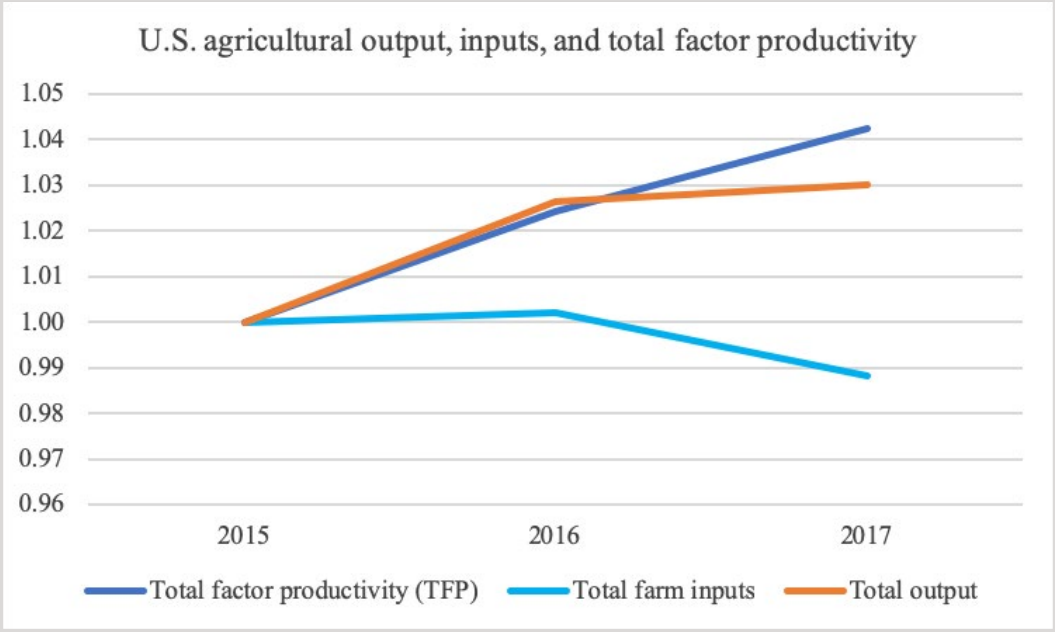
Productivity

Goal: Increase agricultural production by 40 percent by 2050.

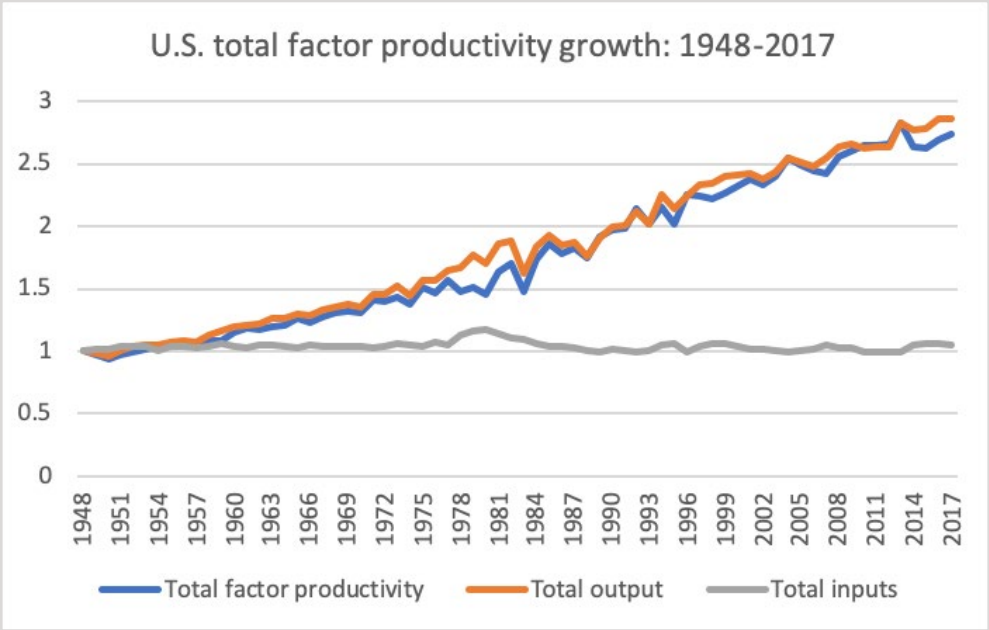
Metrics: Data collected by ERS on **Total Factor Productivity** (TFP) and **real gross output** will be used to track progress towards the AIA production goal.

Baseline: **Real gross output** will be tracked by using 2017 as a base year with an index value of 1.03. To reach the 2050 target of 1.43 (representing a 40 percent increase in real gross output), real gross output will need to increase by 1.02 percent per year. **Total factor productivity** (TFP) will also be tracked using 2017 as a base year, where the TFP index value was equal to 1.4 percent. To reach the 2050 target of 1.44 percent (representing a 40 percent increase in productivity), TFP will also need to increase by 1.02 percent per annum (assuming total inputs remain largely constant).

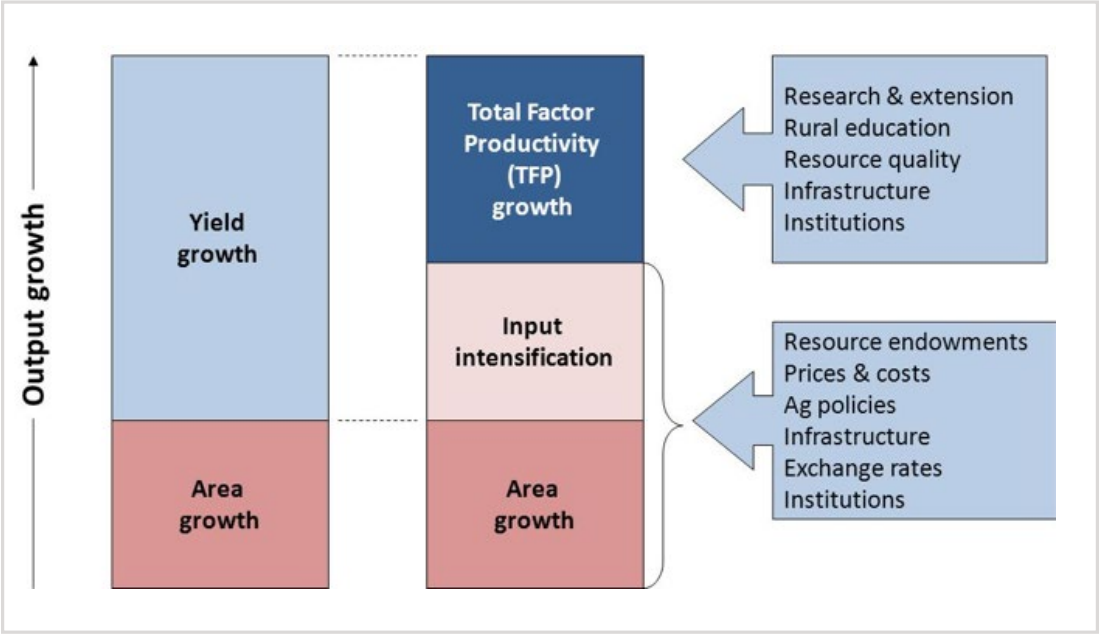
Benchmark: Both TFP and real gross output will need to grow by at least 1.02 percent per year to meet productivity goals.



The primary driver of agricultural TFP growth is innovation that increases efficiency, including changes in the organization and structure of the agricultural sector, improvements in animal and crop genetics, innovations in agricultural chemicals and fertilizers, more efficient agricultural equipment, and cost reductions in farm management techniques. This innovation is fueled by investment in R&D by both the public and private sector.



TFP growth also plays a critical role in reducing potential negative environmental impacts that could occur with increased agricultural production, including the conversion of forests to cropland. To accurately assess environmental benefits that accompany sustainable productivity growth, current measures of TFP must be supplemented with information on other environmental impact measures – the methodology required to produce those calculations is currently in development. The figure below illustrates the primary means of increasing real output growth – increasing the total acres of agricultural land and increasing agricultural yields – and how increasing yields through efficiency gains (TFP growth) can substitute for resource expansion and input intensification.



Food Loss and Waste

Goal: Reduce food loss and waste by 50 percent by 2030.

Metrics: Data collected by ERS on Loss-Adjusted Food Availability (LAFA) and by EPA on U.S. municipal solid waste (MSW) food loss will be used jointly to track progress towards the AIA food loss and waste goal.

Baseline: Progress towards both EPA and USDA's food loss and waste goals use 2010 as a baseline.

- USDA's LAFA uses a 2010 baseline of 133 billion pounds of estimated food waste, with a 2030 goal of reducing losses by 50 percent, to approximately 66.5 billion pounds.
- EPA's MSW food loss goal uses a 2010 baseline of 218.9 pounds of food waste per person sent to landfills, with a 2030 goal of reducing per capita food waste to 109.4 pounds per person.

Benchmark: For LAFA, food loss at the retail and consumer level must be reduced by approximately 3.35 billion pounds annually to reach the 2030 goal. For the MSW goal, food waste going to landfills must be reduced by almost 5.5 pounds per person, per year to reach the 2030 goal.

The food loss and waste goal will use two metrics to track progress towards the AIA goal, USDA's LAFA data series and EPA's MSW estimate. These metrics are derived using different methodologies and can both be valuable in evaluating progress towards reducing food loss and waste. The LAFA data series, compiled by USDA ERS, estimates U.S. national-level food loss at the retail and consumer levels. Food loss is defined by ERS as the edible amount of food, postharvest, that is available for human consumption but is not consumed for any reason; it includes cooking loss and natural shrinkage (e.g., moisture loss); spoilage and discards in retail stores and in homes, and plate waste. EPA's MSW estimate is generated annually and estimates the amount of food waste entering municipal solid waste facilities from residential (e.g. households), commercial (e.g. businesses), and institutional (e.g. hospitals) sectors using waste composition analysis.

Water Quality

Goal: Reduce national nitrogen and phosphorus losses from farmland by 30 percent by 2050.

Metrics: Nitrogen and phosphorus loss estimates from the Conservation Effects Assessment Project (CEAP) Cropland study will be used to track progress towards the AIA water quality goal.

Baseline: Progress towards the water quality goal uses the nitrogen and phosphorus loss estimates from the 2010 CEAP-Cropland report as the baseline where national nitrogen and phosphorus losses were 3.8 billion pounds and 584 million pounds, respectively. To reach the 30 percent reduction target, nitrogen and phosphorus losses from farms must be reduced by 27.05 million and 1.97 million pounds per year, respectively by 2050.

Benchmark: To reach the 2050 water quality goal, nitrogen and phosphorus losses from farmland will need to be reduced by 7.5 percent per decade.

The CEAP-Cropland study represents the best option for creating a national water quality baseline and for measuring future progress towards the 2050 goal. CEAP quantifies ongoing conservation efforts undertaken by farmers across the U.S. and assesses their agroecological impacts, including nitrogen and phosphorus load estimates at the edge of field, edge of watershed, and at the basin outlet. The CEAP-Cropland study released in 2010 represented data from 2003-2006. The study is repeated every 10 years with the second CEAP-Cropland report due to be released in 2021 representing 2015-2016 data.

The 30 percent nutrient reduction goal established by the AIA represents the weighted national average of the additional reductions that are possible from cropland according to the CEAP-1 analysis. While this goal is technically feasible with existing technology, it does not account for the possibility of expanding crop production, non-adoption of practices, or new technologies. This goal is not meant to supplant local or regional water quality goals which may be more ambitious in regions such as the Mississippi River Basin, the Lake Champlain Basin, or the Chesapeake Bay; rather the goal is intended to create a national average water quality target.

Greenhouse Gases and Carbon Storage

Goal: Reduce agricultural greenhouse gas (GHG) emissions and increase carbon storage.

Metrics: The *Inventory of U.S. Greenhouse Gas Emissions and Sinks* and the *U.S. Agriculture and Forestry Greenhouse Gas Inventory* will be used to track and report reductions in both agricultural GHG emissions in increases in carbon storage.

Baseline: For the purposes of the AIA, USDA will use 2018 as a baseline for tracking changes in GHG emissions. Both the *Inventory of U.S. Greenhouse Gas Emissions and Sinks* and the *U.S. Agriculture and Forestry Greenhouse Gas Inventory* will be used to assess progress.

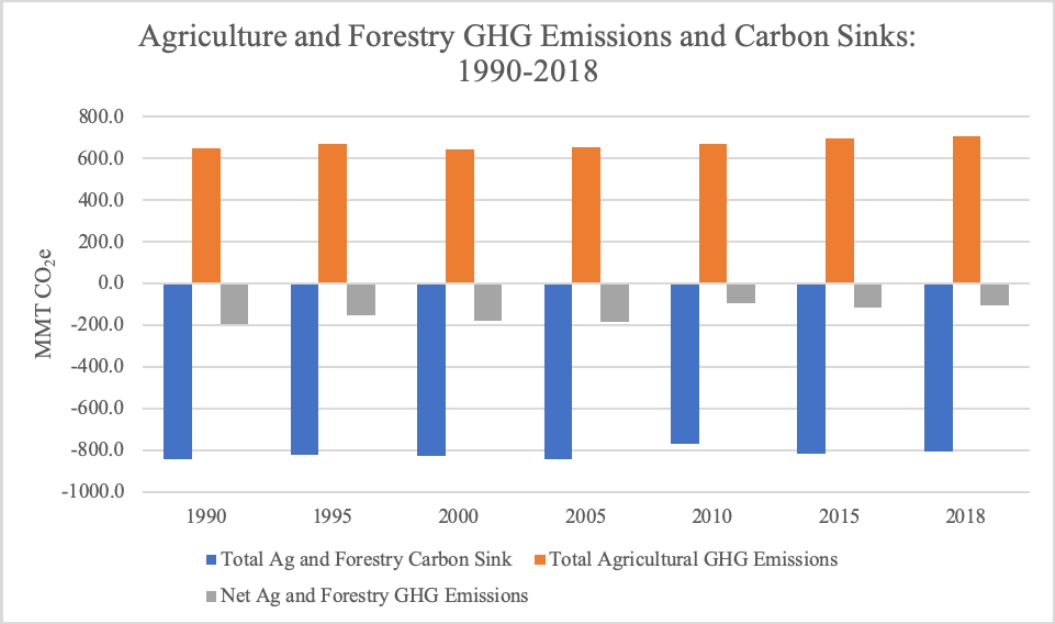
Benchmark: Reduce emissions and increase carbon sequestration from current levels to achieve a net reduction of the agricultural sector's current carbon footprint by 2050.

The *Inventory of U.S. Greenhouse Gas Emissions and Sinks*, developed by EPA and updated annually, provides a comprehensive accounting of all man-made GHG emissions in the United States. Data from this report is supported and expanded upon by the *U.S. Agriculture and Forestry Greenhouse Gas Inventory*, a report developed by USDA that provides a comprehensive assessment of the contribution of U.S. agriculture and forestry to GHG emissions. In 2018, U.S. total agricultural GHG emissions were 705.8 million metric tons of carbon dioxide equivalents (MMT CO_2e), a 9 percent increase from 1990 levels.

Carbon sequestration in cropped and grazed soils represent a small (15.4 MMT CO_2e) sink, while forests, harvested wood products, and urban trees reduce emissions by 564.5, 98.8, and 129.8 MMT CO_2e respectively, offsetting approximately 12 percent of all U.S. emissions. The agricultural soil carbon sink has

increased by approximately 47 percent since 1990, while the sink strength of forestry (forest, harvested wood products, and urban trees) decreased by almost 4.5 percent over the same time period.

After accounting for GHG sources and carbon sequestration, agricultural and forested lands in the U.S. are an estimated net sink of approximately 103 MMT CO_2e. Annual net sequestration has decreased by approximately 47 percent since 1990.



Renewable Energy

Goals:

- *Increase biofuel feedstock production and biofuel production efficiency and competitiveness to achieve market-driven blend rates of E15 in 2030 and E30 in 2050;*
- *Achieve market-driven demand for biomass and biodiesel; and*
- *Increase on-farm renewable energy generation.*

Metrics: Data collected by the U.S. Energy Information Administration (EIA) will be used to track progress on biofuel blend rates and biomass energy use. Data sources include (but are not limited to) the EIA Short-Term Energy Outlook (STEO), Monthly Energy Review, Weekly Imports and Exports, and Monthly Biodiesel Production report. On-farm renewable energy generation will be tracked through data collected by NASS and ERS.

Baseline:

- Progress towards the market-driven blend rate goal uses the 2017 blend rate of 10.13 percent as a baseline. Blend rates need to increase 4.87 percent by 2030 to meet the 2020 target of a 15 percent blend rate; and must increase 18.87 percent by 2050 to meet the target of a 30 percent blend rate.

- Progress towards the renewable energy generation goal will use 2009 as the baseline. The baseline is drawn from the On-farm Renewable Energy Production Survey (OREPS) which served as an add-on to the 2007 Census of Agriculture and collected detailed information on on-farm energy generation in 2009.

Benchmarks:

- The blend rate will need to increase by 0.375 percent per year to reach the 2030 goal. Beyond 2030, the blend rate must increase by 0.75 percent per year to achieve the 2050 goal.

- Increase on-farm renewable energy production from 2009 levels.

Monthly ethanol data on production, inputs, imports, exports, and stocks are available from January 1993 to the present. Ethanol production and use grew most quickly from 2002 through 2010. After 2010, exports began to grow because most gasoline was already being blended with 10 percent ethanol, which is the limit for gasoline that is compatible with all spark-ignition engines. Newer light vehicles can use up to 15 percent ethanol, and a small number of flexible-fuel vehicles are compatible with blends of up to 85 percent ethanol.

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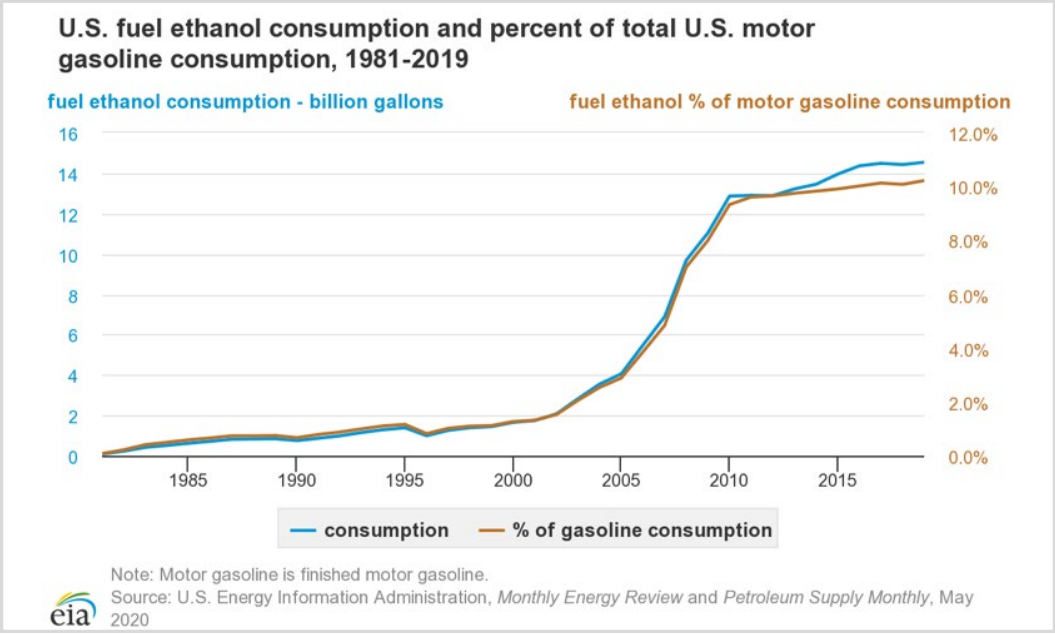

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