


U.S. Rice Industry 2030 Sustainability Goals:

The Future of the Industry is Up to Us





As the U.S. rice industry look towards 2030,
the U.S. rice industry commits to the following goals:

increase
land use
efficiency
10%

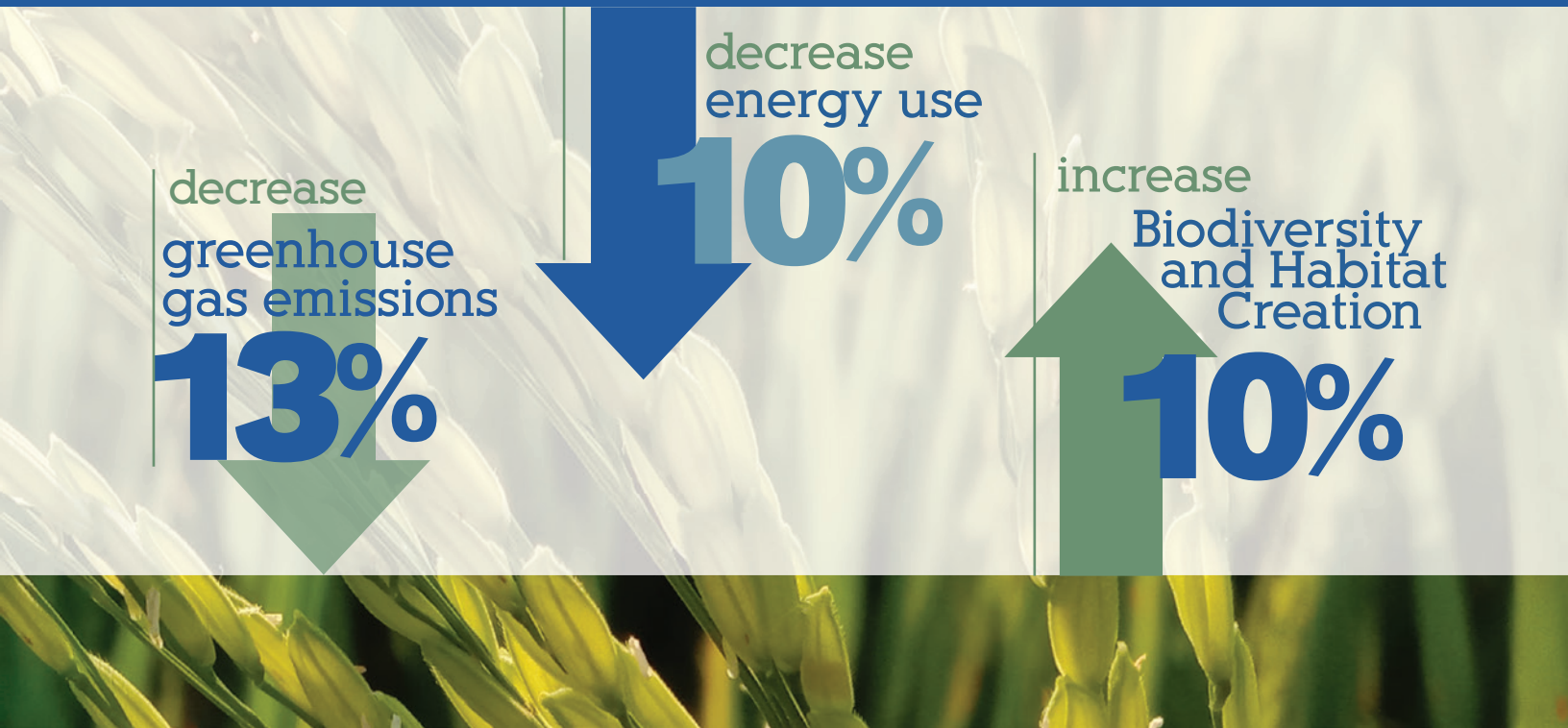
decrease
soil
loss
8%

decrease
water
use
13%

Why Did USA Rice Set Sustainability Goals?

As part of the U.S. rice industry's commitment to conserving resources while producing a high-quality and profitable crop, we are setting industry-wide goals. USA Rice has a role to lead the conversation around what goals and environmental factors are most important and most feasible for our industry.

No one knows rice farming better than rice farmers, so it was important that these goals were developed with farmers at the table. In order to ensure a thriving U.S. rice industry for generations to come, we must continue to be good stewards of the land. These goals are a way to keep the industry accountable as the impressive conservation work continues.



How Were the Goals Developed?

In 2018, USA Rice and The Rice Foundation released a 36-year study of the U.S. rice industry's sustainability record. The unprecedented study clearly showed an industry dedicated to the principles of conservation, and achieving results that create a roadmap to long-term industry sustainability.

Determined to do more, USA Rice engaged a panel of scientists and other experts from each of the six rice-producing states to set reduction targets developed with research-based assumptions about continued improvements. These scientists all agreed that it would be difficult to emulate the same level of sustainability gains achieved in the previous 40 years, but the industry does have opportunities for continued improvement in many areas. Farmer and miller members of USA Rice provided additional input to support these assumptions.

How Will USA Rice Measure Progress?

The *U.S. Rice Industry Sustainability Report* will be used as a baseline for tracking these goals. The data used in that report comes from USDA and are tabulated in the *Field to Market Indicators Report* which is published every four years. In addition to these national data sources, the land grant universities in all six rice-producing states estimate practice adoption and have significant research on how much water, energy, and emissions are saved with these practices. More information on those specific measures is listed under each goal area.

These goals were developed based on the aggregate of U.S. rice production areas and in some cases per hundred pounds of rice produced. Rice is farmed differently in every state and often even within a state. As USA Rice reports on these goals in the coming years, states or regions will not be compared against one another. Instead, aggregate data will be used to show how the industry as a whole is working together to increase sustainability. Rice has a great story to tell and we will continue to report on the impressive gains of our industry as a whole.

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The Alliance for Sustainable Agriculture

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University of Missouri Extension

Biodiversity

increase **10%**

In the fall, levees are kept up to allow for the capture of rainfall over the winter and provide habitat for wildlife. Flooded rice fields provide 35 percent of all food energy for waterfowl and waterbirds that winter in rice growing areas. This practice enhances both conventional and no-till rice production systems by aiding in rice straw decomposition and providing natural weed control. Just beneath the surface of the water, flooded rice fields also support a complex web of life year-round (e.g., frogs, turtles, crawfish, reptiles, and more).

Why This Goal is Achievable

- Additional acres flooded after rice harvest during the fall, winter, and early spring will create habitat and improve the biodiversity profile of rice.
- Increased rice acreage in crawfish production in southwest Louisiana and possibly Texas will lead to additional habitat creation.
- Increased ratoon rice production areas and acreage will create additional wildlife habitat.
- Continued adoption of seed treatment technology will eliminate drift of pesticides which should increase biodiversity including preserving pollinators like honeybees.

Practices That Will Help Achieve This Goal

- Leaving rice stubble or rough plowed ground after harvest for habitat
- In-season flooding of rice fields
- Over-winter flooding or rainfall capture
- Field reservoirs and tail water recovery systems

Current Initiatives

- Corporate and philanthropic support leveraged through the Rice Stewardship Partnership (RSP) enables additional acres to be winter flooded. Continued support of these programs will lead to further increases.
- Shallow water flooding is covered under NRCS programs which producers can use to increase winter flooded acres. NRCS practice numbers: EQIP 646, CSP 646, EQIP 436, EQIP 447, CSP 436, CSP 447
- California Rice Commission, UC Davis, and Cal Trout's Pilot Salmon Project has yielded promising results and could allow for additional species to benefit from overwinter flooded rice fields.

How USA Rice Will Measure This Goal

- The Field to Market Indicators Report did not include biodiversity at the time the *USA Rice Sustainability Report* was published. They have added this metric and it will be used informationally, but since there is not a baseline it will not help with determining goal progress.
- USA Rice will use an estimate of winter flooded acres of rice fields as the measure for improved biodiversity. Wildlife organizations' tracking of the increase in winter flooded acres will inform biodiversity metrics.

FARMER SPOTLIGHT: **MICHAEL BOSWORTH**

Along with his family, Michael operates Rue & Forsman Ranch in Rio Oso, California. Michael is committed to local wildlife conservation, adjusting field flooding schedules to create seasonal bird habitat on more than 1,000 acres in the fall, winter, and spring. These acres support more than 200,000 birds representing more than 50 different species. This important habitat often provides unexpected benefits for his rice farming operation, such as when late flood establishment allows weeds to germinate and sprout, helping Michael more easily target them in the field. "I need to farm rice 180 days a year, but I can also have other productive uses for the land the other 180 days," Michael says, describing his holistic approach to farming and wildlife conservation. "It's figuring out how to maximize the benefits of the land year-round."

decrease 8% Soil Loss

Due in part to the unique nature of rice production practices, erosion hasn't been a major problem for rice. Heavy clay and silt loam soils that are often ill suited to other crops retain water very well, making them perfect for rice production. Erosion continues to decline due to rice cultivation practices such as land leveling for more precise irrigation and innovative water control structures, making rice one of the lowest soil erosion crops per-acre.

FARMER SPOTLIGHT:
CHRISTIAN RICHARD

Christian Richard is a sixth-generation rice farmer in Kaplan, Louisiana. As he says, "U.S. farmers should be proud to tell the story of how we are being productive while conserving natural resources and maintaining the safest food supply in the world." Christian has integrated beneficial conservation practices throughout his farming operation, including precision leveling and conservation tillage. Practices like these help Christian move water efficiently across his fields and hold the soil in place, minimizing erosion and nutrient loss. These efforts also contribute to visibly clearer water, a good sign that the water quality is improved through Christian's conservation management practices.

Why This Goal is Achievable

- Reductions can be achieved through increased use of land leveling techniques using laser and satellite technology.
- Reduced tillage and the need for less cultivation through the adoption of furrow irrigated rice may help further reduce soil loss.
- Increases in acres producing rice in more upland conditions, increases the potential for minimum tillage practices to further reduce soil loss and increase soil health in those fields.
- Advancements in cover crop rotations in U.S. rice production areas will further facilitate the use of reduced tillage systems which will also have a positive impact on soil health and erosion.
- Continued increases in yield will decrease soil loss per unit of production.

Practices That Will Help Achieve This Goal

- Precision land leveling using laser and GPS technology
- Conservation tillage practices that greatly reduce tillage
- Cover crops
- Furrow irrigated or row rice
- Drainage techniques that minimize soil loss (pipe drops, tailwater recovery, etc.)

Current Initiatives

- Irrigation Land Leveling is covered by NRCS programs which producers can use to increase leveled acres. NRCS practice numbers: EQIP 464, CSP 464 EQIP 430, 447, CSP 430, 447
- University research on furrow irrigated rice (row rice) and cover cropping systems with rice rotations.

How USA Rice Will Measure This Goal

- USA Rice will use the aggregate modeling data provided by Field to Market in the *Field to Market Indicators Report* to track soil loss metrics.
- In addition, USA Rice will track adoption of beneficial practices through state research and extension as well as USDA survey data.

Water Use

decrease
13%

Water is the most important resource for our industry. Innovative practices are being used and developed to improve efficiency and reduce overall water use. More commonly used water conservation methods include alternate wetting and drying (AWD), furrow-irrigation (row rice), multiple inlet irrigation, and tailwater recovery systems. Farmers use a combination of these water conservation methods to create a system best suited to their water infrastructure and field design.

Why This Goal is Achievable

- More precision leveled (including zero-grade) acres will lead to additional reductions in water use.
- Increased adoption of irrigation management technologies such as AWD, multiple inlet rice irrigation (MIRI), and furrow-irrigated or row rice will decrease overall water use. Research and field experience have shown that these technologies can be used with little or no impact on yield (compared to conventional flooding systems) while using less water and reducing labor costs.
- Advancements in sensor and pump technologies which allow for remote monitoring of water levels will allow for more efficient irrigation and thus additional reductions in water use.
- An increase in tailwater recovery and other systems to recycle water and utilize more surface water will lead to decreased ground water use.

Practices That Will Help Achieve This Goal

- Precision Land Leveling
- Multiple Inlet Rice Irrigation (MIRI)
- Furrow Irrigation (Row Rice)
- Alternate Wetting and Drying (AWD)
- Water Level Sensors and Pump Automation
- Tailwater Recovery and Surface Water Reservoirs

Current Initiatives

- Many efficient irrigation practices are covered by NRCS programs which producers can use to help offset costs of adoption. NRCS practices numbers: EQIP 447, 449, 464, 587, CSP 447, 449, 464, 587
- Rice Stewardship Partnership
- Delta Plastics H2O Initiative
- On-farm research on new irrigation practices and their effect on yield, grain quality, and other outcomes.

How USA Rice Will Measure This Goal

- USA Rice will use the aggregate modeling data provided by Field to Market in the *Field to Market Indicators Report* to track water use metrics.
- In addition, USA Rice will track adoption of water saving practices through state research and extension as well as USDA survey data.

FARMER SPOTLIGHT: SCOTT MATTHEWS

Scott Matthews, a farmer from Northwest Arkansas, uses advanced irrigation techniques like Multiple Inlet Rice Irrigation (MIRI) on all his rice acres. "I use multiple-inlet irrigation because most of my fields are precision leveled and I'm also in a critical groundwater area, so water efficiency is a necessity." Scott now has close to zero irrigation water runoff from his fields which is a major component of his improved water efficiency. "When you're watering a field and calibrating your pumps, you realize that irrigation is a math problem." This system has enabled him to better capture rainfall for irrigation and flush for chemical purposes without stressing the rice. "In my experience, using MIRI along with PipePlanner is the most efficient way to irrigate and it keeps me from getting behind during the growing season."

13% decrease

Greenhouse Gas Emissions

Greenhouse gasses are any gasses that trap heat in the atmosphere. This includes carbon dioxide, methane, nitrous oxide, and the fluorinated gasses. Because most rice is produced under flooded conditions, rice fields typically produce more methane gas than upland crops. Rice farmers and millers must carefully weigh options, seeking to increase production efficiencies and maximize environmental benefits at the same time. Many water-saving irrigation practices also have a significant impact on the amount of methane produced in rice production, creating a win-win for farmers and the environment.

FARMER SPOTLIGHT: JIM AND SAM WHITAKER

Alternate wetting and drying is critical to the successful conservation practices on Jim and Sam Whitaker's operation in Arkansas. Their farm has increased yields while using 60 percent less water than the state average for rice production and reducing their nitrogen use by 20 percent. "Now, we're using less water than soybeans, corn, or cotton. Rice is the most ecologically friendly crop we can plant, if we manage it properly," stated Jim. A two-year field study reveals water savings of 624,000 gallons per acre. That's an impressive 4.3 billion gallons of total water savings during the 2016 growing season. Their system also results in a smaller carbon footprint, reducing methane gas emissions to the atmosphere.

Why This Goal is Achievable

- Increased adoption of practices that allow for some aeriation of the soil during the growing season can lead to a reduction in the amount of methane produced during rice production.
- Adoption of efficient irrigation practices that allow the soil to be exposed during the season decrease both water use and methane gas emissions. These practices include Alternate Wetting and Drying (AWD) and furrow irrigated rice (row rice).
- Continued adoption of fertilizer enhancers and best management practices for nitrogen (N) fertilizer application will further reduce losses of nitrogen to the atmosphere and in water runoff.
- Conversion of internal combustion engines on irrigation systems to electric or natural gas, will continue to improve air quality.
- As older tractors, combines, and field equipment are replaced with newer equipment, which have significantly lower emissions, air quality improvements will continue.

Practices That Will Help Achieve This Goal

- Alternate Wetting and Drying (AWD)
- Multiple Inlet Rice Irrigation (MIRI)
- Furrow-Irrigated Rice (row rice)
- Fertilizer best management practices
- Conversion of diesel pumps to electric or natural gas

Current Initiatives

- Private industry carbon trading program
- Emerging carbon and ecosystems services markets
- Many efficient irrigation practices are covered by NRCS programs which producers can use to help offset costs of adoption. NRCS practices numbers: EQIP 449, 533, 590, CSP 449, 533, 590

How USA Rice Will Measure This Goal

- USA Rice will use the aggregate modeling data provided by Field to Market in the *Field to Market Indicators Report* to track greenhouse gas metrics.
- In addition, USA Rice will track adoption of water saving practices and conversion of wells and equipment through state research and extension as well as USDA survey data.

Energy Use

decrease
10%

Multiple efficiencies, from more fuel-efficient farm equipment to management practices that require fewer passes on or above the field, have helped U.S. rice farmers make great strides in reducing energy use. At the mill, production facility efficiencies and renewable energy are becoming increasingly common, with enterprising millers working to convert waste — rice hulls — into energy. Across the industry, integrating solar technology is reducing energy costs and offsetting energy use.

Why This Goal is Achievable

- Increased adoption of conservation tillage and precision irrigation technologies will lead to fewer tractor passes over fields which will decrease energy use.
- Increased adoption of irrigation systems such as AWD and furrow irrigation in rice production reduces the amount of water pumped onto a rice field and thus decreases energy use from pumps.
- Conversion of internal combustion engines to electric engines on irrigation systems will decrease energy use. Additionally, the use of energy audits and mechanical improvements in pump efficiencies will further decrease energy use.
- Installation of solar farms and bioelectricity production both on-farm and in drying and milling operations will decrease the use of energy as well as increase the use of renewal energy sources.

Practices That Will Help Achieve This Goal

- Solar on the farm or at the mill
- Increase in rice hull biofuels
- Phasing out of older equipment for more fuel-efficient models
- Tillage practices and irrigation methods that reduce tractor passes on the field

Current Initiatives

- State tax credit programs (availability and incentives vary by state).
- U.S. Department of Agriculture Rural Energy for America grants that can pay up to 25 percent of a renewable energy system's cost.

How USA Rice Will Measure This Goal

- USA Rice will use the aggregate modeling data provided by Field to Market in the *Field to Market Indicators Report* to track energy reductions.
- In addition, USA Rice will track adoption of energy-efficient technology and production as well as practices that reduce tractor passes in the field, through state research and extension as well as USDA survey data.

FARMER SPOTLIGHT: AJ HOOD

AJ Hood is a farmer for Tiller & Company in Tiller, Arkansas. The operation includes 625 solar panels plotted on a little over an acre which offset about 75 percent of the electricity needed to dry rice in the six adjacent 30,000-bushel grain-storage bins. "We started by looking at the numbers and the more we looked, the more we realized that this is something economically feasible for growers." Federal grants and tax credits reduced the farm's up-front investment, but Hood says the real advantage was making his electric bill more predictable. "It takes a lot to dry rice down, so we typically burn a lot of electricity in that one location," Hood says. The 200-kw solar array is expected to reduce his energy bills by about $30,000 annually. AJ believes that, "solar is going to be as practical on a farm as a tractor in the next five years."

increase 10%

Land Use Efficiency

Increasing demands on land use in the United States necessitate the most efficient use of land for any given purpose. In agriculture, efficient land use means producing more crop on the same or less land. Land use efficiency measures the amount of land required for a unit of production—for rice, the acreage to produce one hundred pounds of rice (hundredweight). As precision technology and plant breeding increases yields, land use efficiency will also increase.

INDUSTRY SPOTLIGHT: DR. ADAM FAMOSO

Dr. Adam Famoso is the rice breeder at the Louisiana State University AgCenter H. Rouse Caffey Rice Research Station near Crowley, Louisiana. He is an expert in the use of Marker Assisted Breeding technologies. Adam sees the potential of this technology to advance the industry in the next decade. He says, "Marker Assisted Breeding is primed to revolutionize rice breeding. We can now look at early generation material and eliminate those lines that do not have the desired combination of traits that we are looking for while rapidly advancing those that do. This will allow rice breeders to provide new varieties with continuous yield improvements as well as other traits such as disease resistance which will decrease the use of crop protectant products in the future."

Why This Goal is Achievable

- The use of Marker Assisted Breeding will facilitate rice variety development in the future. This will allow for incorporation of more stable disease resistance to predominant U.S. rice diseases (sheath blight, blast, and narrow brown leaf spot) into future varieties which will allow for yield improvements as well as more yield stability across growing seasons.
- Hybrid acreage (and thus yield improvements) may expand, especially if grain quality improvements can be incorporated into future hybrids.
- Yield increased on average by 67-90 lb/A/yr from 1999 to 2014. Some regions were better than others. California was only about 45 lb/A/yr while southern Louisiana was close to 110 lb/A/yr. Experts contend that level of increase is unlikely to continue, and that yield increases will be at most 50 lb/A/yr. So, over 15 years that is 750 lb/A increase, or a nearly a 10 % increase over our current national average yield of 7,500 lb/A.
- CRISPR technology could have a significant impact on yield improvements in the future. While there are some questions concerning the ultimate acceptability of this technology by rice end-users, most scientists think the technology will be readily incorporated into future varietal improvements activities.
- Ratoon rice production increases will increase pounds of rice produced per acre.

Practices That Will Help Achieve This Goal

- The U.S. has outstanding rice breeders. Both public and private breeding programs will continue to provide varieties and hybrids to the U.S. rice industry with improved yield performance while maintaining the quality standards inherent in the U.S. rice industry.

Current Initiatives

- University breeding programs
- Private breeding programs

How USA Rice Will Measure This Goal

- USA Rice will use the aggregate modeling data provided by Field to Market in the *Field to Market Indicators Report* to track land use efficiency metrics.
- In addition, USA Rice will track average yield data for rice production through state research and extension as well as USDA survey data.

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