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Sevana Bioenergy on-farm biogas production site

Regenerating Agriculture: Coordinating Action Across the Global Food System

From volatile weather to shifting geopolitics, farming is under pressure as never before. To feed a growing global population while reducing emissions, agriculture must increase crop yields by 70% by 2050 and significantly cut its carbon footprint. To meet these goals, many of the world's farms are evolving fast, blending profit with sustainable practices. Rabobank, Arva, and a consortium of bioenergy companies and experts—Sevana Bioenergy, EcoEngineers, South Jersey Industries, LF Bioenergy, and ag sustainability expert Cyn French—were interviewed for this report. They are among those powering this shift, showing how finance, technology, and bioenergy can transform the food system at scale.

Sponsored by: Arva, LF Bioenergy, eco engineers AN LRQA COMPANY, SEVANA BIOENERGY, SJI, US AG & DAIRY SUSTAINABILITY ADVISING

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Scaling Regenerative Agriculture: A Conversation with Rabobank's Justin van der Sluis

As climate volatility and geopolitical shifts converge, agriculture faces a transformation more complex than any in the last century. Justin van der Sluis, Rabobank's chief food and agriculture economist, outlines the urgent shift to regenerative and climate-resilient farming, the critical role of supply chain partnerships and the policies and capital needed to drive change.

The urgency of regenerative transformation

"The most urgent transformation is the transition to more regenerative and climate-resilient farming systems." Van der Sluis points to increasingly erratic weather and geopolitical instability as dual stressors that are compressing farmers' margins and threatening food system stability. While decarbonization remains vital, adaptation must take center stage. This transformation entails restoring soil health, enhancing biodiversity and carbon sequestration —all while maintaining productivity and building resilience. "Farmers can't do this transition alone; you need the whole value chain to change and the system to work together."

The power of value chain collaboration

"The one thing that is really undervalued is supply-level decarbonization and adaptation partnerships between farmers and food companies."

While agtech continues to draw headlines, van der Sluis emphasizes partnerships between farmers, food companies and financiers as the true catalysts for climate-smart agriculture. A Rabobank collaboration with Farm Frites and McDonald's incentivizes regenerative potato production with premiums and discounted loans. These partnerships decarbonize supply chains, build long-term relationships and secure resilient supply amid climate volatility.

A harder transformation than ever before

"Never before have we had such strong national carbon reduction targets, yet the tools that got us here can't take us forward." Unlike the post-WWII boom, today's constraints include limited land, environmental degradation and fragile global supply chains. Companies are shifting from flexible sourcing to long-term procurement partnerships, spreading sustainability costs more evenly across the chain.

Policy and incentives

"Trying to capture a nature-based system into a top-down framework is incredibly difficult." Government policies like the EU's Common Agricultural Policy are moving toward rewarding ecosystem services. Pre-competitive corporate cooperation and standardized metrics will be key to scaling change without overburdening farmers.

Looking to 2035

"The real drivers are climate and geopolitics. Technology and capital are enablers." The next decade will be shaped by the pressure to stabilize food systems amid growing climate disruptions and shifting trade patterns. While larger farms may adapt more easily than smallholders, broader adoption of practices such as agroforestry could deliver major gains. •

"Regenerative agriculture at scale would be the real breakthrough we're all looking for."

Justin van der Sluis
Chief food and agriculture economist, Rabobank

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by **LUCY HURST** *and* **NIGEL HOLLOWAY**

Arva Builds a Regenerative Bridge Between Farmers and Food Companies

Regenerative agriculture is gaining traction as a transformative approach to farming, not only restoring soil health and biodiversity, but also helping draw carbon from the atmosphere. At the forefront of this movement is Arva, a Houston-based company that blends agronomy, science, machine learning, and farmer partnerships to make regenerative agriculture scalable and profitable. "We've built a bridge between the farm gate and the downstream buyers to address their sustainability goals," says Jay McEntire, Arva's CEO.

This bridge—connecting farmers to climate-conscious corporations—is what makes Arva a leader in a crowded field of ag-tech innovators. The company opens new revenue streams for growers through the sale of supply-chain carbon reductions to corporations.

Despite the promise offered by regenerative agriculture, it remains far from mainstream. One reason McEntire points to is systemic economic pressures where the goal is to maximize output. Still, the Arva CEO is optimistic. "Every farmer wants to be more sustainable," he says. "What we need is a system that values the sustainable impact from regenerative agriculture."

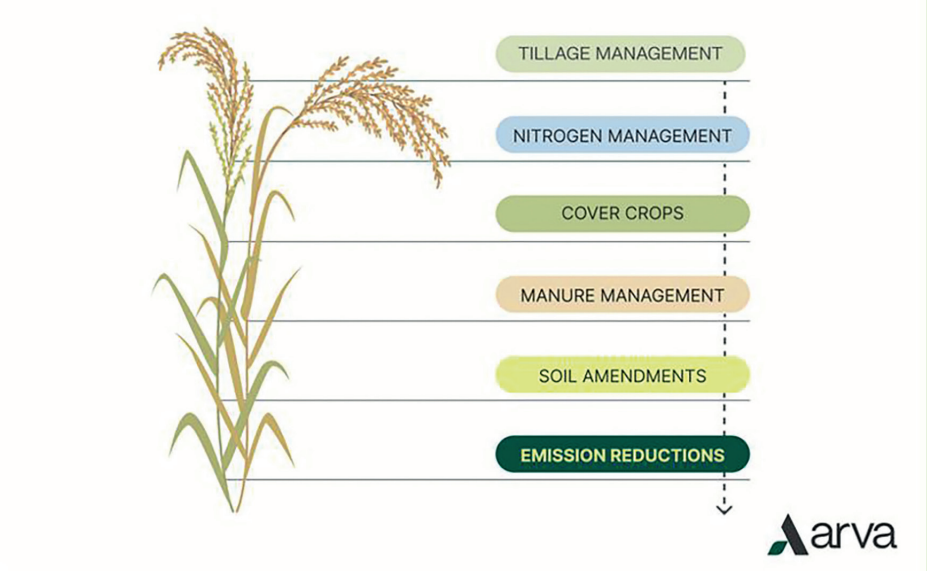
The company leverages field-level data to generate customized insights for farmers to enable them to shift to sustainable practices. These involve replacing traditional practices with regenerative farming that improves soil health and stores carbon. Farmers earn money by selling verified environmental assets from the stored carbon, and corporations buy the assets to meet their sustainability goals.

Arva's scientific links set it apart. In collaboration with Lawrence Berkeley and Oak Ridge National Laboratories, the company developed a patented soil stratification model that uses data from climate models, remote sensing, soil chemistry, and carbon data to define Arva Ground Types, creating farm management zones. This technology helps food companies manage Scope 3 emissions and plan multi-year crop strategies.

Arva's growth has been rapid. In 2022, it paid $400,000 to farmers and associates by selling environmental assets on their behalf. By 2024, cumulative payments had reached $60 million, covering 2.6 million acres across eight countries. It is expanding its reach to 12 countries and is pushing the boundaries of carbon modeling through a partnership with a global energy service company. "We have a patent filed with them to create a reservoir model for soil carbon," McEntire says. "Once we get carbon down three meters, it's out of harm's way. We can compete with direct air capture in terms of outcomes and profit."

Arva's work is not just about technology and carbon credits, it's about reshaping the agricultural economy. By aligning farmer incentives with corporate climate goals, Arva is helping make regenerative agriculture both viable and scalable. •

Impact of Regenerative Agriculture on Field-Level Emissions



How Bioenergy Is Powering Climate Solutions and Rural Prosperity

As the clean energy transition accelerates, some of the most impactful innovations are emerging far from the traditional power centers of Wall Street and Silicon Valley. They're happening on America's farms, where producers are turning everyday byproducts, such as manure and organic residues, into renewable natural gas (RNG) and electricity.

The process is elegant in its simplicity: farmers supply manure and other feedstocks that are anaerobically digested to create biogas and nutrient-rich digestate. The biogas is then upgraded into renewable energy, typically pipeline-quality RNG or electricity, while the digestate often returns to fields as a natural fertilizer.

The result is a closed-loop system that cuts methane emissions, improves soil health, generates renewable energy and creates new revenue streams—all from the same footprint.

Climate solutions rooted in agriculture

"This is a triple win—for farmers, for the environment, and for energy and food security," says **Brad Pleima**, president of EcoEngineers, a clean energy consulting, auditing, and advisory firm, based in Des Moines, Iowa.

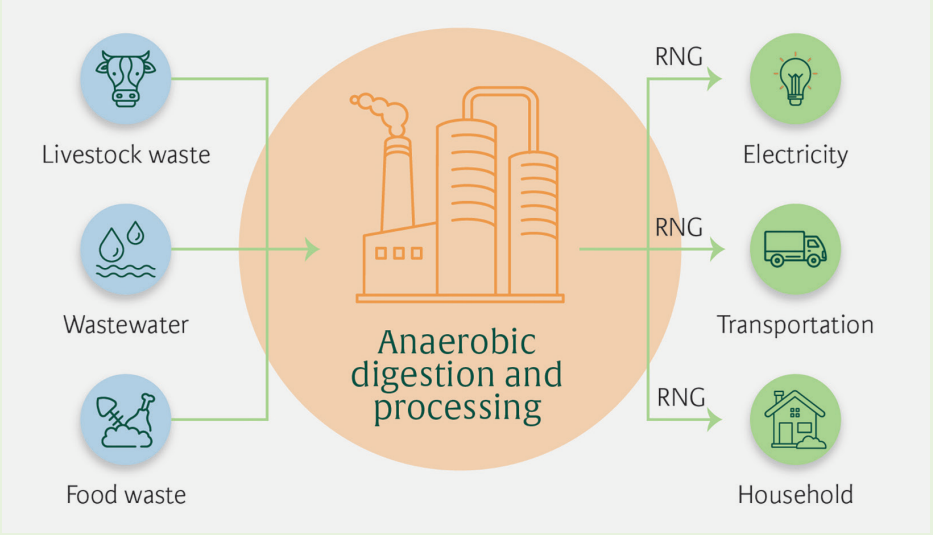
"Biogas projects not only capture methane before it escapes into the air but also produce fertilizer from the leftover digestate of manure. This acts as a nutrient-rich soil amendment, enhancing soil health and water retention—key principles of regenerative farming."

South Jersey Industries (SJI), an energy infrastructure company headquartered in Folsom, New Jersey, is accelerating its bioenergy initiatives to drive both cleaner energy and faster economic growth. Over the next year, more than 20 dairy digesters will be online, processing manure into RNG and high-value fertilizer. "These projects not only generate new revenue streams for farmers but also position SJI to explore the monetization of CO_2 waste streams, further expanding the value of its decarbonization efforts," says CEO **Mike Renna**.

Growing rural economies

The economic story is just as compelling for the bioenergy industry. "Creating new revenue streams for farmers by sharing the value from converting manure into renewable energy and integrating operations is a game-changer," says

Renewable Natural Gas Process



by **LUCY HURST** *and* **NIGEL HOLLOWAY**

Steve Compton, CEO of Sevana Bioenergy, based in Boise, Idaho, and a developer and operator of large-scale RNG facilities.

LF Bioenergy (LF), a U.S. RNG development and operations company focused on "farmer first" solutions with a track record of successful projects across the U.S., emphasizes the local dimension. "Our projects live in symbiosis with farm partners, creating rural jobs and improving the sustainability footprint of agricultural operations," says CEO **Brent Lilienthal**.

The benefits to farmers helps boost rural communities. EcoEngineers' Pleima says, "These projects keep revenue in local economies and create new income streams from practices like cover cropping—planting noncash crops between harvests to protect and enrich soil—and reduces tillage."

Building a market framework

Despite these benefits, scaling up is constrained by fragmented U.S. government policy. Industry leaders are not calling for a carbon tax but coherent, market-friendly incentives, driven by policy. "Accelerating progress requires agreement to consistent policies and frameworks that prioritize sustainability and decarbonization benefits, which in turn create markets that drive innovation," says Lilienthal.

Sevana Bioenergy underscores the financial dimension: "The change that would most accelerate progress across the bioenergy value chain comes in two parts—a stable economic model to support healthy returns and a long-term infrastructure build-out." Compton adds, "Despite the immense promise of anaerobic digestion, the investment required for the development of decarbonization infrastructure remains a challenge."

SJI emphasizes the need for a unified, performance-based carbon crediting framework built on lifecycle-carbon-intensity metrics. Such a system would unlock private investment, enable the aggregation of smaller-scale projects and elevate bioenergy as a central pillar of the clean energy transition. "A transparent, cross-sector crediting system is the structural change needed to scale bioenergy and deliver lasting value," says Renna.

Cyn S. French, principal at US Ag & Dairy Sustainability Advising, says farmers are a key part of the solution.

"We don't need perfect—we need progress that pays. Farmers already rely on science every day, from feed selection to soil and water management. That same rigor should guide bioenergy policy," French says. "If we treat farmers as sustainability partners—not just suppliers of feedstock—we can activate a national network of locally produced RNG that powers decarbonization while reviving rural economies."

Innovation drives the future

While inconsistent policies pose challenges, technology is propelling bioenergy forward. There are huge gains to be made. The American Biogas Council says there are more than 2,500 operational biogas systems in the U.S. and the potential for 17,000 more. The know-how therefore exists to transform the sector. "The next decade's biggest breakthrough is about making proven solutions reliable, affordable, and viable for farms to continue modernization of their operations, resulting in the highest level of nutritious food production," says French.

EcoEngineers' Pleima sees momentum in modular anaerobic digesters, smaller prefabricated systems and precision carbon-accounting tools. These local-scale conversion technologies allow farms to produce renewable energy and fertilizers directly on-site. Pleima explains, "The breakthrough will be integrating regenerative agriculture with modular, local-scale conversion technologies."

Building on this momentum, companies like Sevana and SJI are investing across a range of feedstocks—including agricultural residues, food waste, and other organics—to convert these materials into RNG. SJI's Linden Renewable Energy production facility in New Jersey exemplifies this approach, with the capacity to process over 1,500 tons of organic waste daily and produce nearly 3,800 mmBtu of RNG. "Food waste is the next major market opportunity," Renna notes.

Building the future today

Industry leaders agree that bioenergy is no longer an experiment, it's a proven solution with measurable benefits for climate, agriculture, and rural prosperity. "We're not waiting for the future; we're building it now. Bioenergy is already delivering climate results, economic value, and energy security. What we need is the confidence to scale up," says Pleima.

As policymakers and investors seek clean-energy solutions, agricultural bioenergy is a powerful opportunity. With rigorous science, forward-thinking policy, and continuous innovation, waste is transformed into value. Rural America is ready to lead the energy transition, turning its resources and resilience into long-term environmental and economic gains. •

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