Cultivating farmer prosperity: Investing in Regenerative Agriculture

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About OP2B

OP2B is an action-oriented business coalition for the protection and restoration of biodiversity. Our mission is to improve agricultural biodiversity throughout value chains by scaling-up the deployment of regenerative agriculture and restoration of high-value ecosystems. Positioned at CEO-level, while working at an operational level with technical actors, OP2B is an impactful coalition of 26 engaged companies across the entire value chain.

The OP2B coalition was born from the conviction that regenerative agriculture is the best way forward for agriculture-centric value chains as well as for the planet and people. Our members have taken strong commitments and engaged ambitious investments and internal transformation processes to contribute to the spreading of this new practices' framework.

Disclaimer on the report and graphics presented

When reviewing the report and graphics, please be aware of the following:

Scope of the analysis: We understand that Kansas is home to a wide range of agro-ecosystems, each with varied climate characteristics. Our report presents averages to cover a wider scope, and while broad regional themes such as lack of water availability are considered, the analysis, including defined systems of practices, transition timelines, and economic impacts should not be considered prescriptive for any individual region or farm.

Illustrative landscapes: The landscapes and figures we present for potential financing pathways during the farmer transition are hypothetical and are in no way meant to taken as dogmatic. Rather, they showcase one of many scenarios of the role each stakeholder can play in supporting the farmer.

Data: With the exception of a farmer survey we commissioned, all data utilized in this report is publicly available and from the following sources:

National/International organizations	State universities	Other
Environmental Defense Fund	Clemson University	Advance Cover Crops
Field to Market	Iowa State University Extension	Fastline
No-Till on the Plains	Kansas State University	GreenCover
Soil Health Partnership	North Dakota State University	Outside Pride marketplace
Sustainable Markets Initiative	Ohio State University	Various peer-reviewed academic papers
United Nations Food and Agriculture Organization	Penn State Extension	
USDA Agricultural Marketing Service	University of Illinois	
USDA Economic Research Service	University of Massachusetts	
USDA Forest Service	University of Missouri Extension	
USDA National Agriculture Statistics Service		
USDA National Resources Conservation Service		

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Introduction

We are living through climate and nature crises. The depletion of natural assets and soil health is hurting our farmers, endangering the productivity and resilience of our lands. Agriculture itself is the single largest driver of global biodiversity loss[1], and the global environmental, health, and socioeconomic costs associated with today's food and land use system total nearly $12 trillion per year.[2] Yet we have proven agricultural systems that can help mitigate this damage and restore ecosystems. Regenerative agriculture is not a new concept, but its connection to fighting biodiversity loss and the climate crisis is now more important than ever.

And at the center of it all is the farmer. We set out to listen to and magnify the farmer voice by better understanding barriers to moving toward more regenerative farming practices. While studies have shown that regenerative farming systems can build resilience for farmers, questions remain around the economics. We looked at the P&L (profit and loss), agronomic and financial challenges, and market opportunities from the farmer's vantage point and found that while the long-run business case for regenerative agriculture is strong, the risks of changing farming practices are significant.

These risks cannot be borne exclusively by farmers. We must find new and better ways to support farmers through consolidated financial, technical, and educational support systems that both de-risk farmers' efforts to move toward more regenerative landscapes and secure the longevity of these impacts on our ecosystems.

1. IPBES 2019 Report (S. Díaz et al., Science 366, eaax3100 (2019). https://doi.org/10.1126/science.aaw3100)
2. FOLU - Growing Better: Ten Critical Transitions to Transform Food & Land Use; Losses refer to environmental (biodiversity loss, greenhouse gas emissions), health (malnutrition, obesity), and socioeconomic (poverty in agricultural labor) costs

Context on Regenerative Agriculture

We recognize that there is no single definition for regenerative agriculture. For our study, we use OP2B's outcomes-based framework , which, at its core, focuses on harnessing soil biology to do what it does best – drive environmental and economic outcomes for farmers and their surrounding communities.

OP2B's Definition of Regenerative Agriculture

Related to agroecological principles, regenerative agriculture is an outcome-based farming approach that generates agricultural products while improving soil health, biodiversity, climate, water resources, and supporting farming livelihoods.

Regenerative agriculture is a holistic approach that aims to, simultaneously, promote above- and below-ground carbon sequestration, reduce greenhouse gas emissions, protect and enhance biodiversity in and around farms, improve water retention in the soil, reduce the use of pesticides, improve nutrient use efficiency, and support farming livelihoods.

Our analysis, which examined and built upon existing studies of regenerative systems and their impact on yields and profits[4], demonstrates that there can be a positive business case for regenerative agriculture in the long run, with profits reaching as much as 120% above profits of farmers using conventional practices. These findings are

3. OP2B Framework for Regenerative Agriculture
4. Regenerative Agriculture Benefits in Germany and Beyond
   SMI Agribusiness Taskforce - Scaling Regenerative Farming: An Action Plan

from the perspective of an American farmer growing mono-cropped hard winter wheat in Kansas, moving to a more diverse basket along with practices that enable regenerative outcomes. We believe that this analytical modeling approach can be adapted to any crop in any region, assuming data on farmer profit & loss statements (P&Ls) and climate factors is available. Putting the farmer at the center of this evolution is critical to driving conversations and ultimately action that will help scale implementation.

Our findings show a potential positive business case in the long-run, but the journey to get there has challenges and risks. The transition phase, during which farmers incorporate regenerative actions into their farming practices, can be an average of 3-to-5 years, a period during which farmers may experience temporary losses in revenue from decreased yields and capital outlays for specialized equipment. Farmers need help. Public and private sectors must enable farmers during this transition, offering both direct financing as well as technical and educational support. With corporate sustainability call to action being heard loudly around the world, there is newfound urgency to catalyzing change.

How are we defining regenerative agriculture?

For the purposes of this analysis, we have identified a set of farm and land management practices that, based on scientific literature, enable OP2B's regenerative outcomes in the context of hard winter wheat farming in Kansas. These practices comprise a "Regenerative System". This link between practices and outcomes, such as soil moisture content, has further implications on yield and revenues.

We have grouped these practices into "basic-intermediate" and "advanced", which we are calling System 1 and System 2, respectively. We have assumed that farmers could transition to System 2 following the stabilization of System 1 (following the 3 to 5-year transition period). Exhibit 1 summarizes the actions that comprise System 1 and 2

Importantly: We do not intend to prescribe any particular set of practices and recognize that regenerative systems will need to be tailored for each farmers' context including crop type, geography, soil composition, water availability, climate, and even market conditions.

Exhibit 1 - Regenerative agriculture involves a range of actions that drive environmental and livelihood outcomes

Primary OP2B framework outcome	System 1 Basic-Intermediate adoption	Over time → System 2 Intermediate-Advanced adoption
		Diversifying the rotation: Add 2 suitable cash crops to the rotation
Protecting & enhancing biodiversity	**Diversifying the rotation:** Add 1 suitable cash crop to the rotation **Cover cropping:** Cover soil year-round with single species cover crop **Intercropping:** Intercrop row crops with suitable legume	**Cover cropping:** Cover soil year-round with a multiple cover crop species **Undersowing:** Undersow row crops with a suitable cover crop/grass **Hedgerows:** Restore 10% of cropland to natural prairie with integrated shrubs
Improving soil water & carbon retention	**Conservation tillage:** Reduce tillage intensity to "mulch till" (<80 on the USDA STIR scale) **Water retention:** Practice mulching across the land **Livestock integration:** Graze and rotate external livestock on the land for a portion of the season	**No-till:** Reduce tillage intensity to "no-till" (<20 on the USDA STIR scale) **Water retention:** Incorporate drought-resistant crop species into rotation **Livestock integration:** Integrate formal rotational grazing systems year-round
Decreasing pesticide & fertilizer usage	**Pesticide use reduction:** Reduce toxicity (EIQ) of deployed pesticides	**Pesticide use reduction:** Reduce pesticide use by incorporating pest-resistant species into the rotation **Integrating biofertilizers:** Optimize synthetic fertilizer use, employ biofertilizers
Improving farmer livelihoods	Culmination of collective actions expected to improve farmer livelihoods	

Actions may span across multiple outcomes of the OP2B framework. Phases were defined through analysis of regional RegenAg actions, existing adoption roadmaps, expert interviews, and BCG analysis– the outlined systems are not meant to serve as a prescriptive or exhaustive definition for all crops and geographies.

The farmer voice

We began with the farmers' perspectives. We surveyed nearly 100 row crop farmers of varying levels of adoption (from strictly conventional to veteran regenerative) and interviewed additional early adopters at regenerative farm shows in Kansas to hear their perspectives directly. While every farmer holds a unique view that reflects their own individual growing conditions, the overall message was clear: Early adopters cited tangible benefits from regenerative systems – notably healthier soil, reduced input costs, fewer complications from fertilizer run-off, greater biodiversity, and better resilience to extreme climate.

Although regenerative agriculture receives much attention for its carbon sequestration potential, this reason was least motivating for the farmers we surveyed – only 5% cited carbon as their primary reason to adopt. Instead, farmers pointed to reduced input costs and soil health benefits as most motivating (at 35% of farmers) – as one said, *"when I saw those first few earthworms coming up across my field, I finally felt like I was [farming] the right way".* Since this revelation, he has been farming regeneratively for nearly 20 years.

This is just one example of the positive cycle that regenerative systems can activate – when soil biology is given a suitable environment to thrive, outcomes like reduced soil compaction naturally ensue, leading to better crop performance and long-term economic value.

Despite these positive signals, for many farmers the idea of transitioning to a regenerative system is fraught with concerns. Indeed, 45% cited potential transitional yield declines and prohibitive upfront costs as their top concerns around adoption. Farmers feel that they bear the brunt of these risks, given the perception that current crop insurance and subsidy systems favor conventional farming. In addition to the financial challenges, many farmers simply feel ill-equipped, that they lack the knowledge and resources needed to operationalize a regenerative system. Farmers can't simply flip a switch to activate new systems; they must hone these practices over time and adapt to an ever-changing uncontrolled environment: nature.

Interviews with farmers revealed other concerns; many noted the social pressure to conform. *"You have to find a way to insulate yourself from the general negativity that you'll get from neighbors, your landlord, and others,"* said one farmer. Others cited their longstanding familiarity with conventional methods, and that transitioning to regenerative agriculture presented an existential risk. As one farmer put it, *"On a multi-generational farm, the question that always lingers in the back of your mind is, 'Will I be the one to lose it all?'"* The risks and associated economics weigh heavily on their decision-making.

The farmer business case

In order to remain profitable, farmers need to constantly manage their P&L and be disciplined in their practices. Therefore, it's no surprise that farmers' top concerns about regenerative agriculture involve potential loss of income. And while our analysis shows potentially decreased profitability during the earlier stages of incorporating regenerative practices, once past the 3-to-5-year transition, farmers' profits could be significantly higher than what they might expect from continuing with a conventional system, due in part to profit diversification and input use efficiencies.

Consistent with other studies[5], we found that there can be a positive long-term business case for farmers to transition to more sustainable practices – resulting in a 15-25% 10-year ROI – but that there is likely a transition period of 3-5 years or more where the farmer will experience a decline in profits, due to the risk of lower-than-expected yields.

Our analysis focuses on a specific region and crop segment – Kansas (United States) wheat farmers. We understand that Kansas is home to a wide range of agro-ecosystems, each with varied climate characteristics. Our report presents averages to cover a wider scope, and while broad regional themes such as lack of water availability are considered, the analysis, including defined systems of practices, transition timelines, and economic impacts should not be considered prescriptive for any individual region or farm. With this in mind, we chose Kansas because wheat accounts for 19% of annual row crop acreage in the US, and Kansas is the largest state by production, at around 20% of US output.[6] Unlike corn and soy, wheat is predominately used for human food applications. Additionally, a warming climate is projected to result in better long-term outcomes for crop productivity – which is not the case for corn and soy.[7]

5. Regenerative Agriculture Benefits in Germany and Beyond
   SMI Agribusiness Taskforce - Scaling Regenerative Farming: An Action Plan
6. USDA Crop Acreage Report Acreage 06/30/2022 (usda.gov)
7. In future analyses, it would be desirable to be more granular in geography - but for aggregate data availability we chose to focus on the entire state

The starting point

Today, wheat prices and farmer profits are at an all-time high. The USDA projects that prices will normalize over the next three years, with profits returning (declining) to historical levels (all things being equal). In this context, the time is ripe for farmers to begin incorporating these practices, because the high prices could serve as a 'buffer' to minimize the revenue impact of any initial yield declines and new costs.[8] Nonetheless, high prices also increase the opportunity cost of making changes to the farming system.

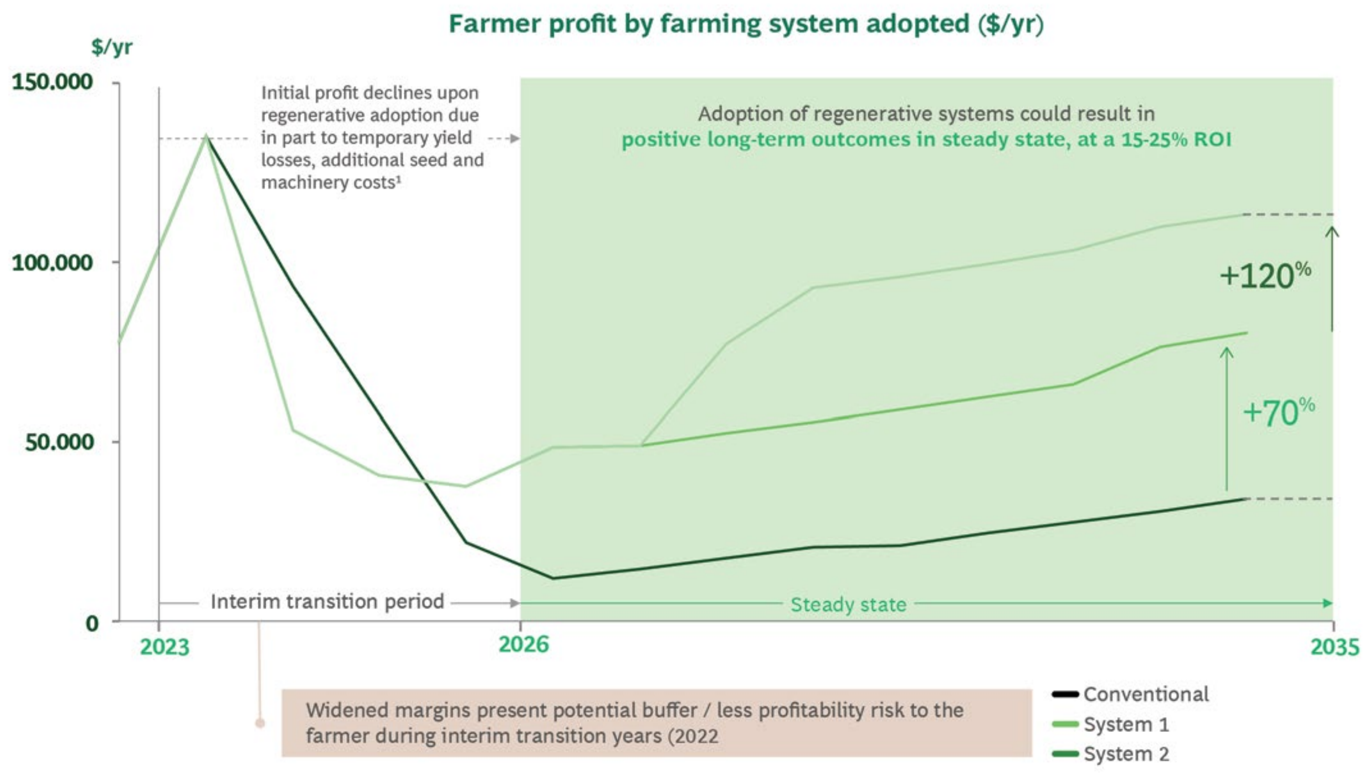
Transition to "System 1"

Once farmers reach a relatively steady state, having incorporated System 1 practices, we estimate that their profits could be on average 70% greater than those of conventional farmers. This is largely driven by new revenues from the introduction of intercropped soybean, as well as reduced input costs. However, the 3-5 year transitional period may see profits dip by an average of 30-60%+ as farmers begin to move away from conventional practices and incorporate these new System 1 actions. This transitional loss is driven by new costs (seed, soy inputs, harvesting) that are not yet able to be offset by the regenerative system, as soil biology is still adapting during this time. Moisture availability may not yet be prepared to support the newly introduced crop, and therefore the soy intercrop of the transitional period may generate yields up to 35% lower than yields in the projected steady state. Additionally, there is a learning curve to incorporating these new practices into a farmer's operations. As a result, Farmer P&Ls may suffer.

Transition to "System 2"

As farmers grow more comfortable with their System 1 practices, they can begin incorporating additional advanced regenerative actions, which have the potential to grow their profits as much as 120%+ above those expected for conventional farming systems. This profit is driven by further increased cropping intensity with the introduction of corn to the rotation; sustained adoption of a regenerative system enables a farmer to sell 3 crops in three years, compared to two in three years in a conventional system. Other more advanced practices such as a multi-crop cover system, optimized input use, and formalized rotational grazing programs further buoy profits.

Exhibit 2 - In the long-term, regenerative systems may generate up to 120% increase in farmer profits; however, declines expected in near-term transition



1. Transitional yield losses due to initial impacts from introducing soy to the dryland cash crop rotation.

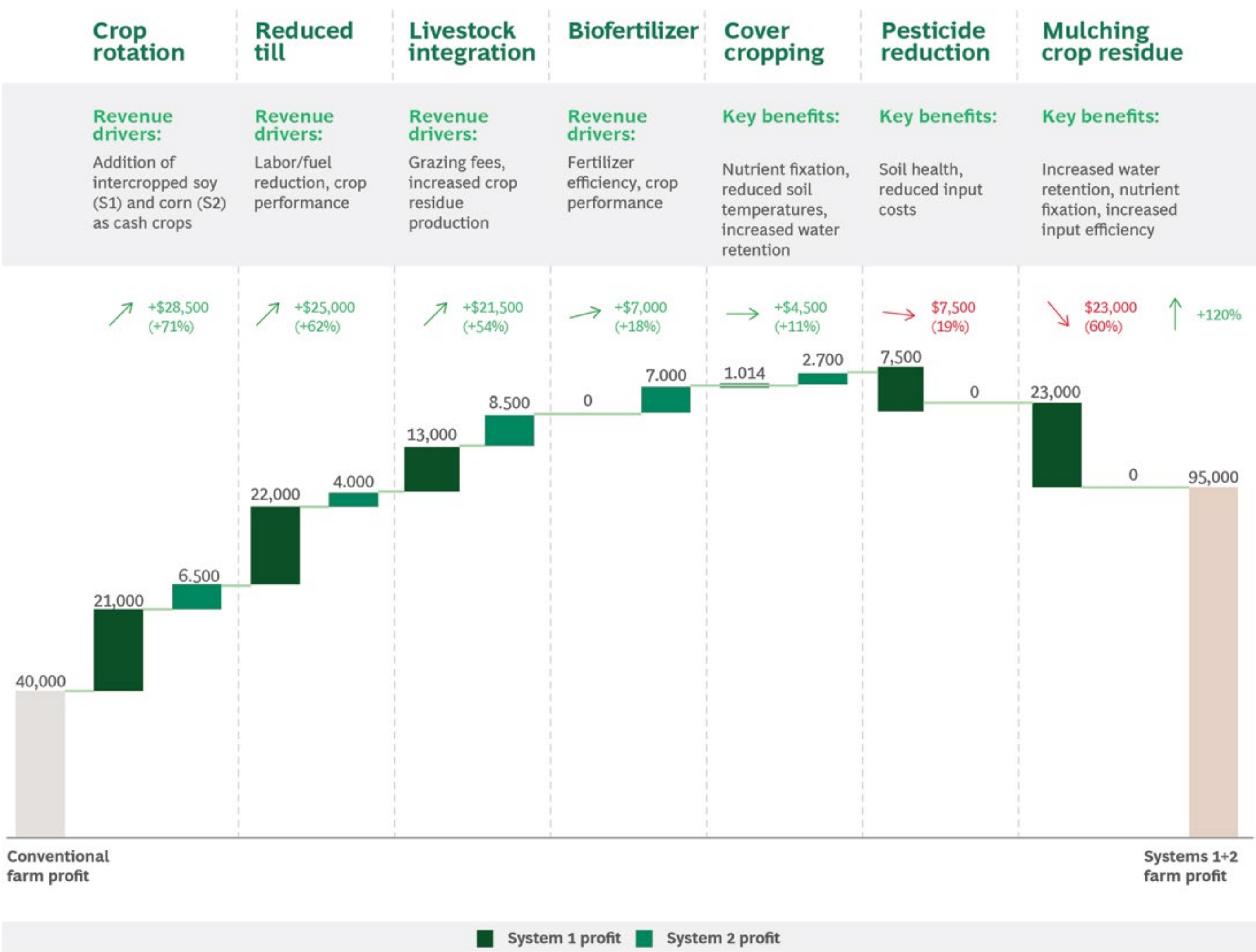
8. Pricing dynamics for wheat are complex today, due to the War in Ukraine, a global food shortage, and regional droughts, causing 41% higher prices than the average of the last 5 years

Exhibit 2 shows the modeled trajectory of the farmer's profitability over time. Note first that there is an initial decline in profits for all farming systems as prices come down from historic highs of 2022 and 2023. Then within the first 3-5 years following transition, the farmer is projected to experience profit losses relative to the conventional farm. Following the initial transition period, however, we found farmer profitability under a regenerative system to consistently outperform the conventional case under favorable climate conditions.

Exhibit 3 shows the key profitability drivers for Systems 1 and 2 in 2030. The most significant improvements come from:

- **Crop rotation:** Increasing revenue from diversifying cash crops by moving from monoculture wheat to rotations that integrate corn and soy
- **Reduced till:** Reducing tillage intensity, which results in lower fuel and labor needs
- **Livestock integration:** Integration of grazing systems for external cattle (e.g., herds from nearby ranchers)

Exhibit 3 - The interplay of actions in Systems 1 and 2 can enable positive outcomes, which may unlock up to +120% steady-state farmer profit



It is key to note that all actions have a role to play in collectively enabling the transition, regardless of their direct profitability. For example, 20-30% of Kansas wheat farmers currently incorporate corn, soy, or both into their growing rotation, but many conventional farmers in drier parts of Kansas are currently limited to a monoculture system due to water constraints. And while mulching crop residue is shown in Exhibit 3 to have a directly negative economic impact, analysis on crop water availability revealed the importance of the practice's water retention outcomes for the success of the expanded crop rotation.

While our analysis shows the opportunity for significant profit upside, the transition period does not come without risk. We estimate that the total profit loss in the transition period can be anywhere from $15-$45+ per acre annually. In less-than-ideal conditions, the profit losses could be higher, the transition period longer, or, in the worst case, farmers may struggle to attain long-term profitability. Some cases may also be more difficult to implement due to challenging local supply chain and logistical circumstances. For example, for a farmer for whom there is no nearby option to market their newly integrated crops, it may make sense to look to a different rotation tailored to their local market context. These are meaningful challenges, and the farmers cannot shoulder the burden alone. They need help preparing for and managing the risk.

Supporting Farmers in the Transition

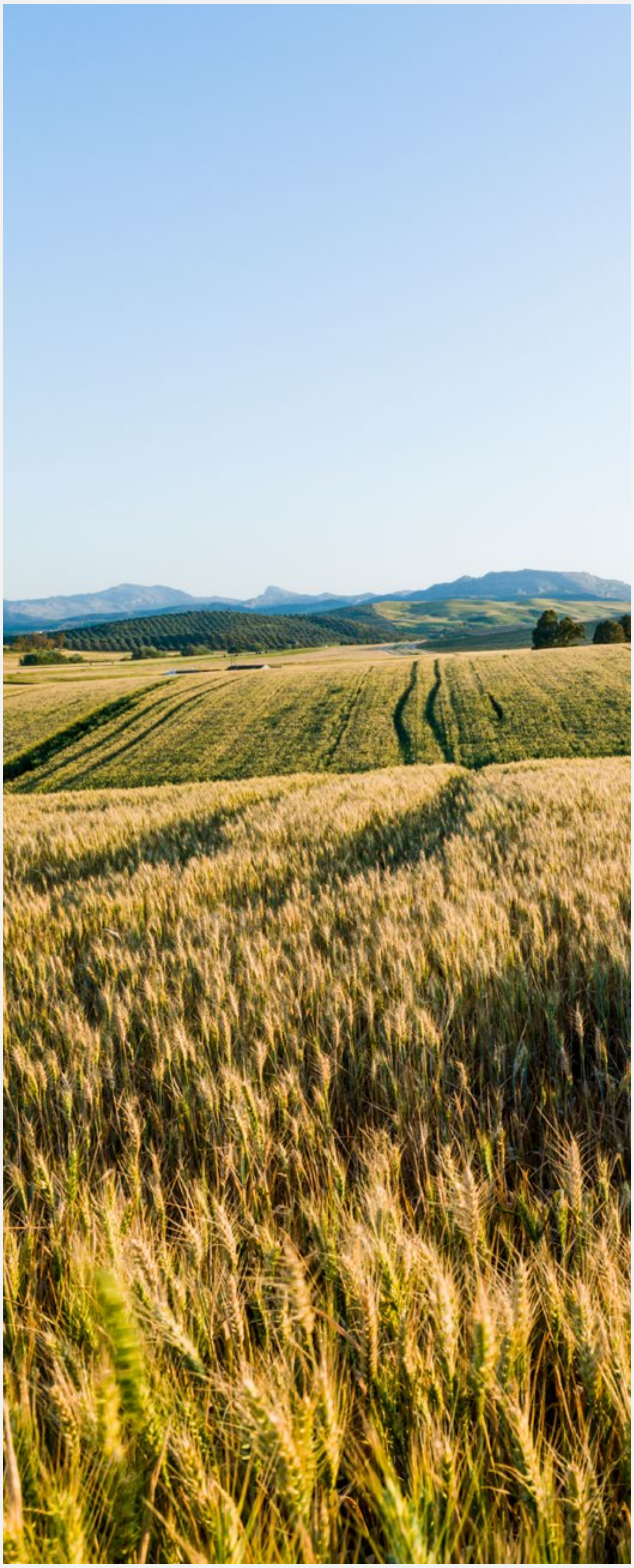
Paul Butler's Story

Paul Butler farms 1,000 acres in central Illinois. Like many farmers in the region, his primary cash crops are corn and soy - but he is a maverick for how he grows them. Paul is a no-till farmer who, for the past ten years, has been increasing his use of cover crops to build soil health and resilience. He has witnessed firsthand how cover crops aerate his soil, reduce erosion, and add nutrients back into the ground.

But his experience with cover crops began with headaches. In just his second year implementing cover crops, central Illinois saw unrelenting early rains. Paul had wanted to terminate the cover crop when it grew to 6" tall, but with the continuing rains he was stuck watching his cover crop grow far larger than he'd ever intended. It reached 18"-tall and was preventing Paul from planting his corn.

With the fields still soaked, Paul attempted to terminate the cover crop, but moisture affected the efficacy of the treatment. The conditions led to an allopathy scenario where his corn became infected by pathogens hosted by the still-living cover crop. All told, Paul lost 25% of his corn crop that season, while also having to bear the expense of the cover crop seed and additional chemicals to terminate.

While Paul's experience was driven by climate factors outside his control, it is a testament to the inherent risk associated with the transition to a regenerative system. Paul decided to continue with cover cropping, and fortunately has not had a similar experience since; his soils have continued to improve and he has served as an ardent advocate for many in his community and beyond. But, as someone who has experienced both the good and the bad of Mother Nature, Paul readily acknowledges the need to de-risk circumstances like those he experienced and believes that in order to effectively increase the acreage under regenerative management, other stakeholders need to step in to aid farmers through both financial and educational support.



While the long-term economic outlook for farmers making the transition to regenerative agriculture may be positive on average and for this specific case, the transition period is nevertheless full of uncertainty. Often these variables are outside anyone's control, and farmers need help to manage that risk. To catalyze change, we must look to de-risk this transition period. Farmers we spoke with – including Paul Butler – highlighted two crucial areas of support: Financial support, and technical / educational support.

The current financing landscape

Several mechanisms aimed at financing the farmer transition to regenerative systems are available today, with widely varying levels of maturity and longevity of intended support. For example, cost-share and lending programs are mature solutions for providing short-term assistance during a farmer's initial transition, while mechanisms like improved insurance products and sustainable leasing agreements are intended to provide much longer-term risk management.

Exhibit 4 - We synthesized 8 key mechanisms to support the farmer transition, leveraging the Sustainable Markets Initiative (SMI) and Field to Market work

SMI Wheat working report[1]

Cost-share programs

Pay-by-practice programs, where stakeholders agree to cover a portion of the costs associated with implementing agreed-upon regenerative actions. Examples include per acre awards by level of adoption

Lending programs

Lending products that offer specialized terms for financing farmer adoption of agreed-upon regenerative actions. Examples include reduced rates, optimized term lengths

Government subsidies

Government-funded grant and subsidy programs dedicated to lessening the financial burden of regen ag adoption. Programs are often paired with agronomic and/or technical support. Examples include per-acre awards for individual practice adoption

Ecosystem service markets

Lending products that offer specialized terms for financing farmer adoption of agreed-upon regenerative actions. Examples include reduced rates, optimized term lengths

Improved insurance terms

Creation of crop insurance products for regeneratively grown crops. Products should, at a minimum, allow regenerative farmers to qualify for crop protection, but may include additional incentives. Examples include reduced premiums, higher coverage

Field to Market[2]

Price premiums

Pay-by-practice programs, where stakeholders agree to cover a portion of the costs associated with implementing agreed-upon regenerative actions. Examples include per acre awards by level of adoption

Sustainable leases

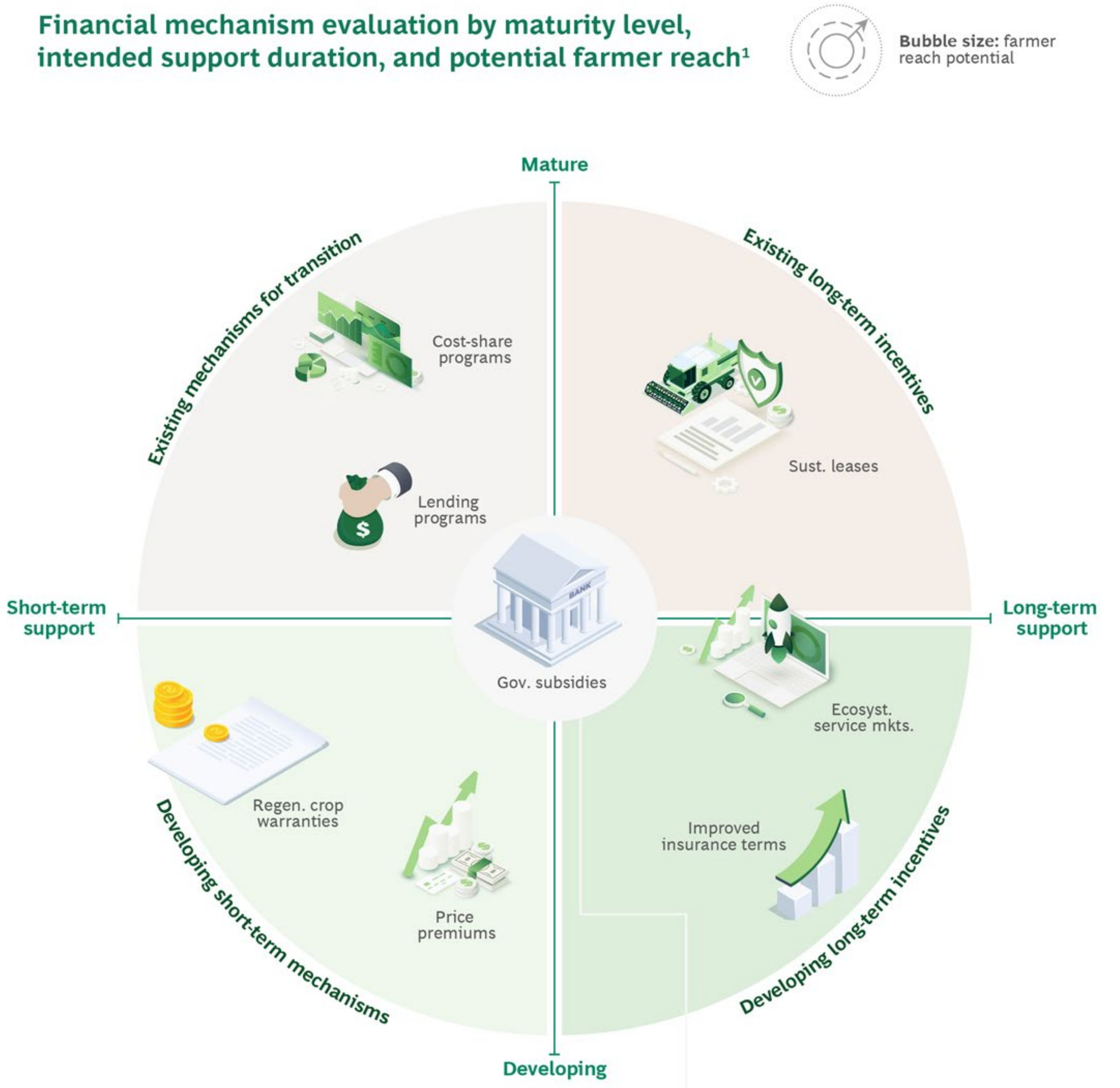
Agreements between the farmer and landowner that ensure the farmer will have the continued ability to lease their cropland, in return for adopting agreed-upon regenerative actions.

Crop warranties

Financial products that de-risk potential transitional yield losses resulting from agreed-upon regenerative actions. Programs may be coupled with agronomic training to lower the risk of yield loss by human error

SMI Agribusiness Task Force 'US Wheat Working Group' paper 2. Field to Market 'Blueprints for the Value Chain' report

Exhibit 5 - Blending multiple financial mechanisms is necessary to support in different phases of transision; some mechanisms need to be developed further



Given maturity and short-term nature, **likely most effective solutions** to support the farmer during their first transition years	Potential role in supporting later adopters, farmers looking to "upgrade" their systems	**Key "bridge"** to support farmers across all stages of their transition	Promising long-term mechanisms that should **be continually developed during the initial farmer transition period**

1. Field to Market Blueprints for the Value Chain report, SMI US Wheat Working Group Report, BCG analysis

Exhibit 5 maps the current landscape of available financing mechanisms, organized by maturity and the duration of support each mechanism is intended to provide. With this mapping, we provide some structure to the existing financial landscape:

Existing mechanisms for the transition

- Cost-share and lending programs are important mechanisms for the initial 3-5 year transition period, given their track record of supporting equipment and profit recovery costs during this phase. Farmers we surveyed described high up-front costs as the second most challenging aspect of transitioning to regenerative systems; these mechanisms are well-suited to alleviate these costs.

Existing mechanisms for the long-term

- Sustainable leasing agreements have the potential to provide long-term cultural and financial support for farmers who do not own the land on which they operate. These mechanisms can become increasingly more critical as regenerative systems flourish, given that healthier land may cause the value of that asset (the land itself) to appreciate; if rent increases correspondingly, then the farmer reaps no benefits of the regenerative system.

- Similarly, ecosystem service markets may be able to provide longer-term support for the farmer's environmental outcomes from adoption, but challenges including measurement, reporting, verification, and market structure currently hinder large-scale rollout.

Developing mechanisms for the transition

- Regenerative crop warranties have shown promise as mechanisms for mitigating potential yield losses associated with the transition. Farmers we surveyed cited potential yield drops as the most challenging aspect of the transition; warranties protecting against this potential loss can empower farmers to take more perceived risks knowing their downside is somewhat protected. However, relatively few of these programs exist today, and scaling will require investments in local agronomic support for regenerative systems in order to lower the risk of yield loss due to human error.

- Price premiums for regeneratively-grown crops could serve as a temporary alternative to a cost-share program. However, scaling would require significant adjustments to procurement systems, particularly for companies without direct farmer relationships.

Developing mechanisms for the long-term:

- Adjusted crop insurance terms that include coverage for regeneratively-grown crops are a crucial long-term support lever to protect against temporary impacts on yield that can be tied to disease, weather, or other unknowns, but such products have not yet become widely available.

Finally, government subsidy programs can act as a "bridge" for farmer support in both the short- and long-term, but many programs are oversubscribed and under-resourced; scaling these will require expansion of funding and increased access for farmers. There are also opportunities to explore the use of data, measurement, and other feedback loops to track outcomes and evaluate effectiveness of these deployed funds.

The Transition Financing Stack

There may never be one single "silver bullet" financing option, but we do need a more comprehensive and holistic financial support mechanism that can scale to reach a large number of farmers. Given the wide variety of standalone financial offerings today, farmers are forced to act as their own financial syndication service – even moreso than they already do today – putting together the combination of financing mechanisms that best suit their needs. Yet this requirement is, at present, a huge barrier to farmers making the transition; it underscores the pressing need for structured multi-product combinations that would allow for a single interface and an easier, more navigable ecosystem for farmers.

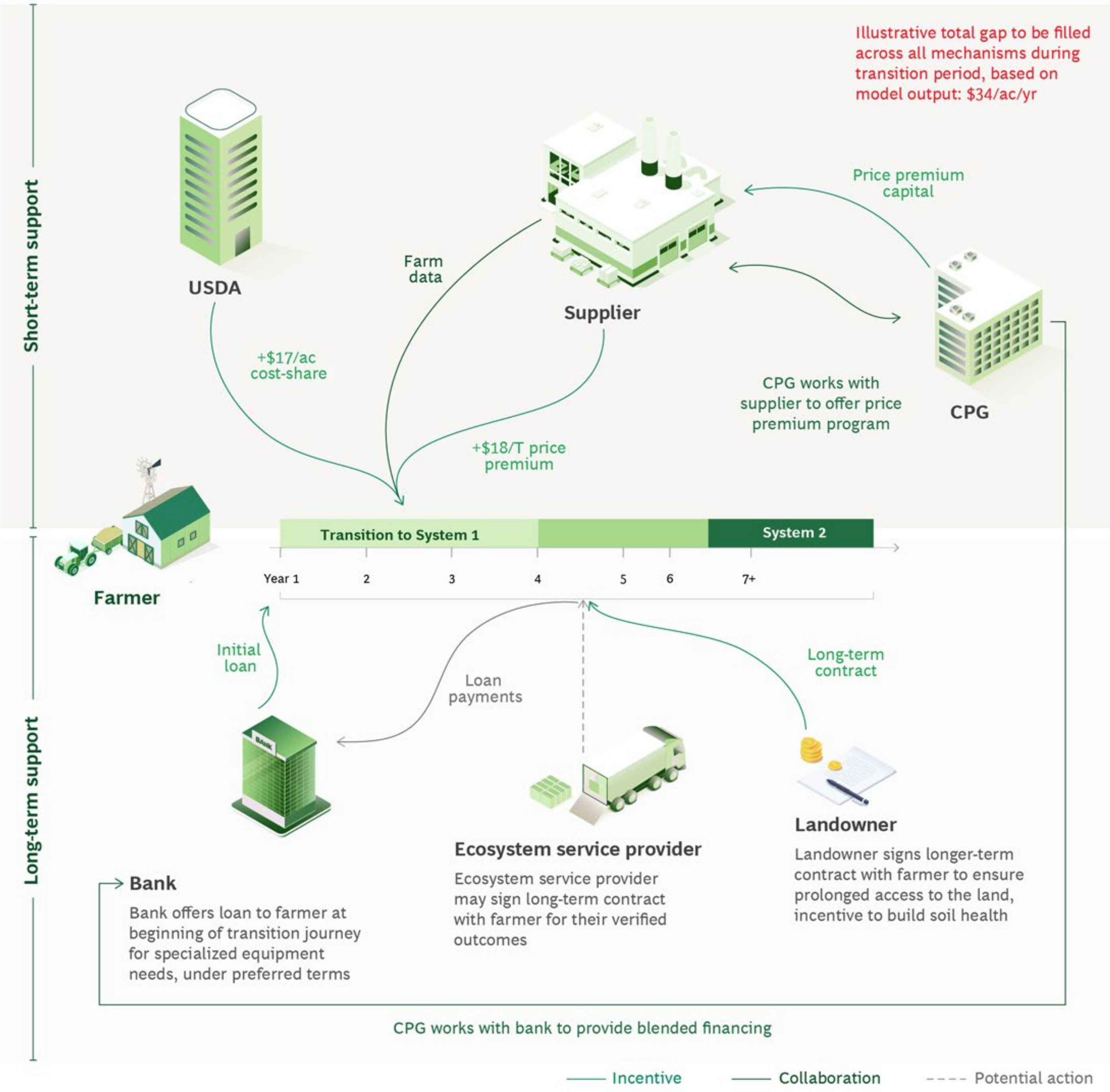
We call this concept the Transition Financing Stack, which underscores the need to distribute costs and risks of the transition throughout the value chain. The stack should de-risk the transition for farmers and, in tandem, provide financing support for the upfront costs they must bear. The size of the gap the stack needs to fill depends on the risk volatility and who owns it. If one can take some of that volatility or uncertainty risk off the table by sharing or pooling it – for example via an insurance product – then the nominal value to meet the bar or fill that pool can decrease. It also requires significantly improved coordination and collaboration across these levers.

The Transition Financing Stack is a concept to underscore the need for blended financing options that join mechanisms where the whole is greater than the sum of its parts. The stack concept is intended to represent financing options that provide farmers with a single interface, simplifying the complex and murky transition financing landscape. This stack is underpinned by mechanisms that, when combined, help share the burden of the risk and expenses of the early years of the transition to a regenerative system. There is no 'one-size-fits-all' solution, but the core principles remain true: Variety, flexibility, simplicity – and importantly, security.

Exhibit 6 - Illustrative farmer financing pathway for shared contribution among CPG and USDA during transition period

Key takeaway: Given the complexity of the financing landscape, stakeholders must collaborate and coordinate to support farmers and determine an effective distribution of risk throughout the transition

NRCS (USDA) supports the farmer through a cost-share program, awarding them during the transition period for beginning to adopt System 1 actions



Indeed, the financing landscape is fragmented and complex. Exhibit 6 presents a hypothetical scenario of what a farmer's financing landscape could look like in the current state. In this illustrative scenario, bank loans could help the farmer with upfront costs for new equipment and other capital expenditures. The farmer's transitional profit loss (approximately years 1-3) could be covered jointly through a USDA-funded cost-share program (such as a conservation incentive program from the Natural Resources Conservation Service) and a consumer goods' company-funded price premium, with the potential for ecosystem service market participation in the longer-term. The figures presented in this exhibit are purely illustrative and not intended to be prescriptive.

Even in this 'simplified' financing landscape, the farmer would have to navigate many disconnected stakeholders to obtain information on available programs, complete the application processes, and keep stock of award eligibility requirements, all while changing fundamental elements of how they run their operations. With so much being asked of our farmers, we run the risk of inundating and overwhelming farmers. Addressing the current shortcomings and complexities of the regenerative transition financial landscape is a critical next step. As one Oklahoma wheat farmer said, *"The only thing that can give Mother Nature a run for her money is Father Profit. I'll grow tumbleweeds if you pay me for it."* We must get the financial element right.

Technical & Educational Support

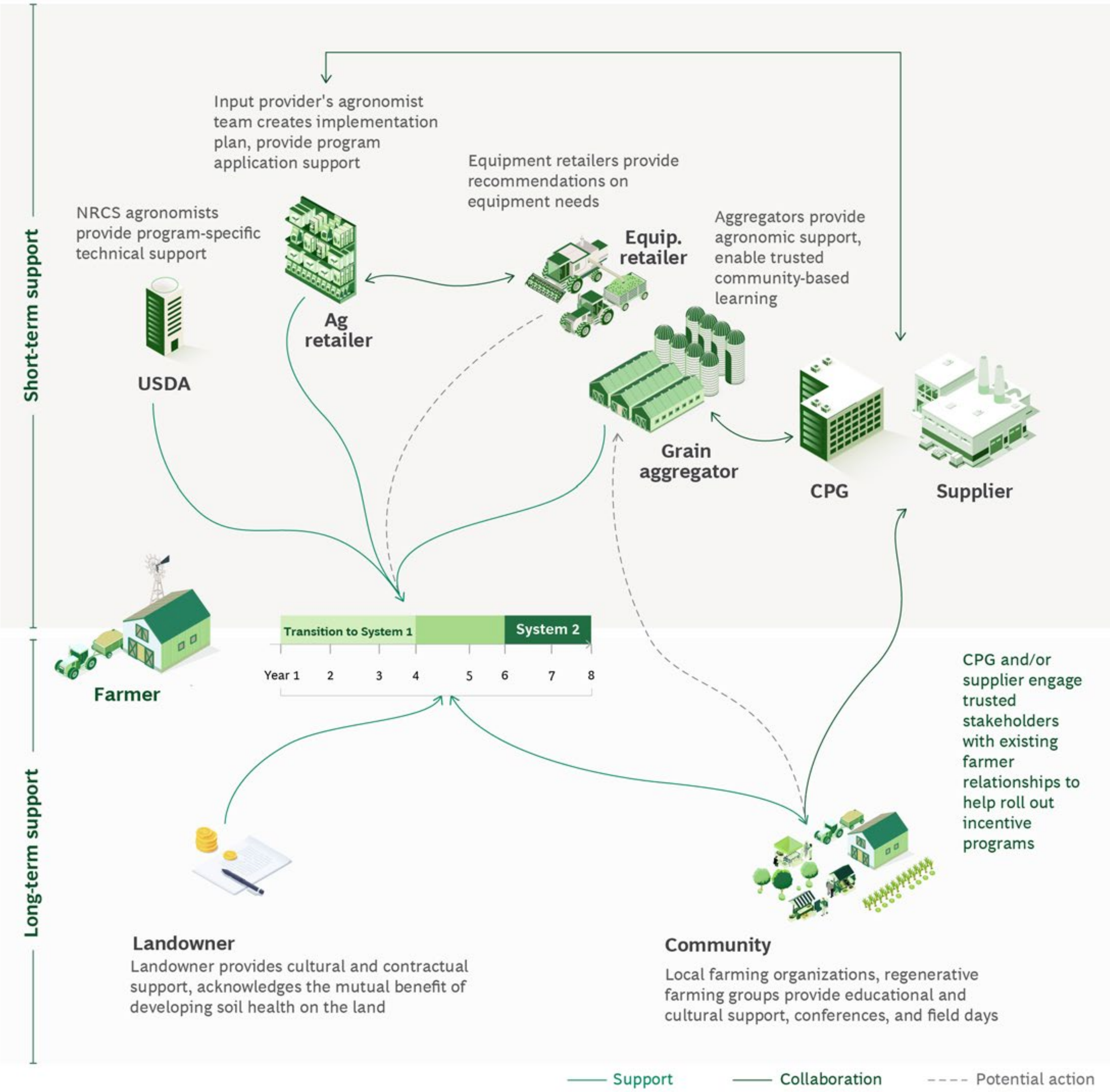
Yet the Transition Financing Stack is not the only solution. Throughout our work one chorus rang true: money without education, knowledge, or cultural support is not the answer. We must mobilize educational and agronomic support for farmers to enable them to successfully adapt their farming practices. Downstream companies that might lack direct access to farmers can also consider making an indirect impact by funding support services that hold farmer trust, which, too, de-risks the transition.

The current educational and cultural support landscape is similarly fragmented and complex, as shown in Exhibit 7, but there is continued need and desire from farmers for more relevant and targeted support. For some farmers, this is a fundamental change to the way they have run their businesses for generations. Educational support is coming from all across the agri-food value chain, including the USDA, input providers, grain aggregators, equipment retailers, and consumer food companies, but there is a lack of coordination between these groups. At the local level, there is continued appetite for learning through farming organizations and regenerative farming groups, whose conferences and field days reportedly very effective. But the element of trust is critical to driving operational change. As one Kansas farmer said, *"Farmers feel safer sharing ideas with a group of 5-10 guys that they know in their region, rather than some random folks they have little-to-no relation with"*. Stakeholders looking to have meaningful impact on farmers must understand and appreciate farming communities' culture and values. This kind of transformative, systemic change will not happen without meaningful relationships, trust, and empathy.

To summarize, supporting the farmer transition to regenerative farming systems is much more than simply financing the projected transition costs. Instead, all stakeholders need to contribute to the development of an enabling ecosystem of financial mechanisms, combined with the relevant technical and educational support. Moreover, this complex web of support needs to be delivered in a simplified manner and made available to farmers in the timescale corresponding with their transition journey. Lastly, though we have not conducted a deep analysis in this report, we also recognize that investments in supply chain infrastructure, including traceability, may be needed for farmers to "get credit" for adopting more sustainable practices.

Exhibit 7 - Illustrative farmer support pathway showcases fragmented landscape for training and cultural support mechanisms

Key takeaway: Stakeholders must collaborate and coordinate to offer educational, technical, and cultural support in addition to financial support, and strive to deliver incentive programs through relationships that farmers trust



Conclusion

So where do we go from here? We only have a select number of harvests left to meet the Paris goal of limiting global warming to 1.5°C, which requires global greenhouse gas emissions to decline by over 40% by 2030.[9] A 3-to-5-year transition period for regenerative systems brings us to 2026-2028. With commodity prices at risk of declining towards historical norms and parallel increasing need for more regenerative systems, this will be a challenging several years for farmers. The private and public sector must work together to catalyze change through financial and technical support and risk management.

Ideally this report serves as a basis for conversation among farmers, agri-food companies, and public sector agencies to drive action, innovative financing, and better access to technical and educational resources that are together anchored in an understanding of and appreciation for the farmer's perspective.

And this work can be impactful far beyond Kansas wheat farmers if it is adapted in new regions and for new crops. It's clear that we need to roll our sleeves up, get our boots dirty, and recognize that this isn't just about a model or a business case, it's about the health of our planet, the resilience of our food supply, and the livelihood of our farmers. With collaboration, orchestration, and a commitment to putting farmers first, we can bring this system to life, together.

9. UNFCCC - Climate Plans Remain Insufficient: More Ambitious Action Needed Now

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Appendices

Methodology

Regenerative agriculture is context-specific and outcomes observed here may be specific to wheat, the US/Kansas sourcing region, climate impact, etc. In other contexts, one may see different effectiveness of certain interventions, while some elements may stay relatively consistent throughout (e.g., yield depression). Every farm has to build their own plan to transition and what practices to introduce or stop. In this analysis, we had to determine the right scope (geography, crop, farmer starting point). Our decision to focus on wheat in Kansas meant:

- The crop of focus is hard red winter wheat, which is an estimated 95% of wheat grown in Kansas[10]
- There are moisture challenges that might not exist in other wheat-growing regions
- Certain practices will work here that won't in other climates e.g., can cover crop more easily vs. frozen ground in northern regions

It also meant that we had to take averages - because Kansas in itself is multiple agro-ecosystems, with variation in (non-exhaustive):

- Climate
- Soil composition
- Soil moisture content
- Cropping intensity (amount of production per acre farmed per year)
- Crop rotation choices
- Cultural practices

For purposes of this model, averages helped us find a balance between scalable (for an impactful vision) and actionable (for implementation). In this context, to understand the overall impact on a farmer's P&L, we assessed the each of following key components for the defined systems:

Revenue:

- Revenues from crop production and sales (yield * price), including sale of residues (e.g., **wheat straw bales**)
- S1 and S2 include incremental revenues from livestock grazing fees

Operational expenses:

- Fertilizer: Nitrogen, Potassium, Phosphate, Lime
- Pesticide: Insecticide, Herbicide, Fungicide
- Seed: All row, perennial, and cover crop seeds, as applicable
- Machinery operation: Labor, fuel, equipment maintenance
- Insurance: Average crop insurance payment in Kansas for designated crop(s)
- Land rent: Average annual land payment in Kansas for designated crop(s)

Capital cost payments:

- Estimated annual payment for additional regen ag equipment (e.g., seeding drills)

The economic analysis did not include the potential effects of grants, subsidies, ecosystem service payments, or other financing mechanisms specific to regenerative agriculture. The objective of the work was to provide a farmer-centric estimate; as such, external environmental impacts (such as the cost of fertilizer runoff) were not included in the calculations shown.

Given the complexity of the farming actions we defined, our approach throughout the modeling process was to carry the assumption that the farmer would have received sufficient agronomic support to make the defined transition effectively. While a transition so significant is uncommon in the present day, our objective was to demonstrate what could be possible under targeted stakeholder action. Other assumptions included:

- Revenue: We do not assume any additional revenues due to yield increases, price premiums, or ecosystem service payments.
- Livestock integration: The modeled assumption is that the farmer would develop an agreement with a local rancher to allow external livestock to graze on crop residues, either through community channels or a grazing exchange platform.

We acknowledge that there are many opportunities to take this analysis further; for example, by adding additional levels of specificity in agro-ecosystem choice or analyzing different potential pathways for the farmer to diversify their revenue.

10. Kansas Farm Food Connection - Wheat Harvest in Kansas

Hedgerows

Integrating hedgerows (also known as alley cropping) is defined as planting strips of shrubs or hedges between sections of crop rows on the farm. Integrating hedgerows has been shown to bring a wide range of soil health and ecosystem benefits, including (but not limited to):

- Improved soil infiltration ability
- Increased soil organic matter
- Reduced soil temperatures
- Reduced erosion, runoff
- Reduced input loss from water runoff
- Improved water quality
- Improved biodiversity
- Weed control
- Crop resistance to wind, major climate events
- Crop performance

While the benefits of hedgerows are wide-reaching (spanning across 5 of the 6 OP2B regen ag outcomes), implementation is challenging. At an average cost of nearly $1000 per crop acre to establish, hedgerows typically require capital beyond what a farmer can bear alone. To bridge this gap, the following actions should be prioritized:

Addressing capital costs: Expanding USDA conservation grant programs, offering improved lending terms

- Some SARE and NRCS programs have provided targeted assistance for hedgerow/agroforestry adoption, but existing initiatives are heavily oversubscribed

Providing cultural and educational support: Increasing agronomic support capacity, enabling field days on experienced farms

Fostering community-level knowledge transfer can help farmer mitigate losses from adjusting their day-to-day operations

Enabling long-term farmer revenue: Developing ecosystem service markets to reward farmers for the environmental outcomes achieved through implementation

- Much of the value created by hedgerow planting is indirect - while input costs are not significantly affected with adoption, the opportunity for diversified revenue through ecosystem services may act as an incentive to adopt

As the primary economic model looks to estimate farm-level economics *without the inclusion of potential financing mechanisms including grants, subsidies, and ecosystem services,* hedgerows have not been included in the System 2 calculations shown.

Existing literature

Throughout this analysis, we have found significant variations in farmer economics across different types of crops, agro-ecosystems, regenerative actions, and associated management practices. To showcase the potential range of outcomes for farmers with different characteristics, we have compiled a short list of previously published analyses on the regenerative transition

Existing studies on transitional farmer economics exhibit a range of applications and methodologies, but collectively present positive long-term results

Source	Result	Key methodological differences
Current BCG + OP2B KS wheat analysis[1]	15% 10-year IRR under expected yield levels **+ 70% long-term profit** over conventional $12-40/ac transition cost during first 3 to 5 years	N/A
BCG Germany analysis	**+60% long-term profit** over conventional No transitional losses	• Considered more diverse cash crop mixes, in line with local context • Quantified yield benefits as "avoided yield loss from drought"
Systemiq + SMI Agribusiness Task Force Analysis	Complete profit loss for 2 years following the transition **+17% long-term profit** over conventional thereafter	• Did not assume adjustments to the cash crop rotation • Included the potential effects of carbon credit sales • Assumed higher machinery costs for precision ag equipment
Ecdysis foundation farming system survey	**+78% long-term profit** over conventional 29% average lower tield compared to conventional	• Survey of 20 real corn farmers in the Midwest • Figures shown are averages across the farms, which had varying track records of adoption
Rodale Farming Systems Trial	**+194% long-term profit** for regenerative organic systems over conventional No long-term yield reduction compared to conventional	• Study considers organic farming, associated price premiums • Wider range of crops rotated, including some without high market demand (e.g., oats) • The trial was run on comparison farms considerably smaller than the typical row crop farm (~12 ac)
EDF Farm Finance Report	**+$22-49 wheat profitability per acre** **+60-75% soy profitability** compared to conventional	• Trial based on real farmer outcomes in 7 states throughout the Midwest and Great Plains • Fewer regenerative actions included in analysis, including no changes in the farmer's rotation
Soil Health Institute	Average increased net farm income of **+$52/acre for corn** **+$45/acre for soybean** for farms employing a soil health management system	• Assessment of 100 corn and soy farms across 9 states • Revenue was calculated using long-term average crop prices • No changes to the cash crop rotation considered

1. Shown result is for System 1 adoption with medium (expected) yield loss, the most comparable scenario to other publications based on type/level of regen actions included.

All studies demonstrate significant long-term profitability gains for regenerative systems: 17 to 78% increases in long-term farmer profit from conventional methods. However, the source and extent of this gain are highly-dependent on the following factors:

- **Farming actions assumed:** The suites of actions modelled vary significantly by report, due to differences in scope and crop/geographic focus. The only actions considered by all reports are Reduced/No Till and Cover Cropping.
- **Crop/Geographic focus:** Some reports, such as the Rodale Farming Systems Trial, measured average annual profitability across all crops farmed, while others narrowed the scope to a single crop of focus.
- **Data sources:** The Ecdysis Foundation, EDF, and Rodale Institute reports were based on farm case study outcomes, while others took a modeling approach

To date, there are very few studies that have modeled the expected economic impact on row crops from adopting a suite of regenerative actions.

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