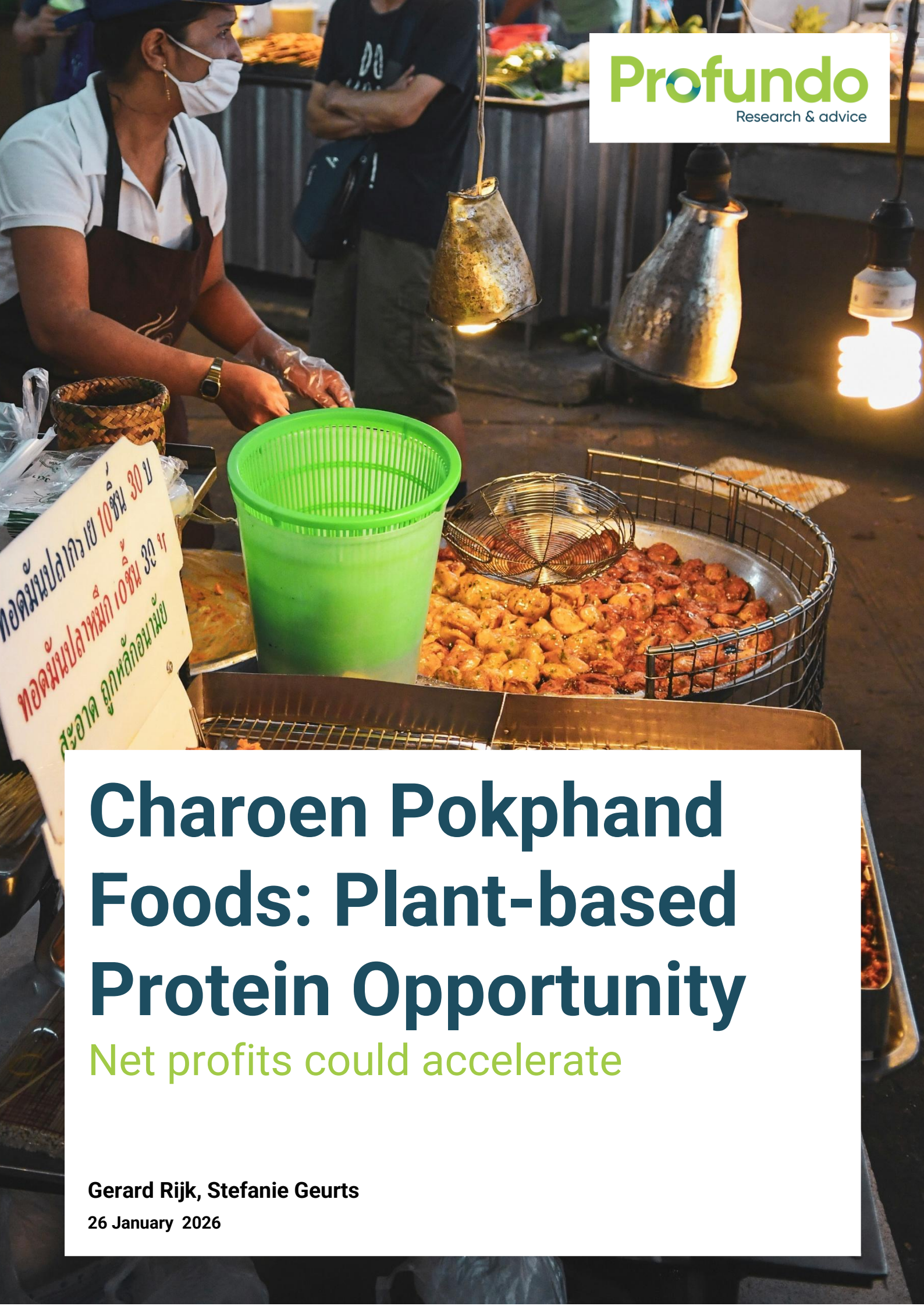

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Research & advice

Charoen Pokphand Foods: Plant-based Protein Opportunity

Net profits could accelerate

Gerard Rijk, Stefanie Geurts

26 January 2026

About this report

This report has been commissioned by Madre Brava

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Authorship

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Contents

List of figures

List of tables

Summary

For Charoen Pokphand Foods (CPF), shifting from chicken, pork, and dairy activities to plant-based protein products is the most effective way to reduce its total climate emissions and land use. Continuing with the current animal-based protein model, even when incorporating on-farm emission reduction measures, yields the worst outcomes in closing the emission gap with SBTi targets. Examining 30%, 50%, and 100% plant-based protein scenarios, to be completed by 2050, will likely add significantly to profits and may materially reduce the company's debts. As the positive impact on reputation from a more sustainable future raises valuation multiples, such as price-to-earnings and the enterprise value to EBITDA[i] ratio, the value of CPF could rise dramatically.

CPF has a large activity in livestock

This report highlights an alternative business case for CPF. The report focuses on its large chicken, pork and dairy activities, including animal feed and the end products for food retailers and food markets.

CPF is a global company active in the livestock and aquaculture supply chains, including feed production, farming, food processing and distribution. The company's production is 37% based in Thailand. Of its revenues, 81% is generated in Southeast and East Asia, and the remainder in Europe and the Americas. CPF has small activities in alternative proteins and brands in the plant-based protein product market. Around 88% of its revenues are generated from livestock activities, and the rest comes from aquaculture.

Climate emissions and ambitious SBTi-based reduction targets by CPF

CPF reports Scope 1, 2 and 3 emissions, and has SBTi[ii] approved emission reduction targets for 2030 and 2050. Total Scope 1, 2, and 3 emissions amounted to 39.3 million CO_2e in 2024, an 8% increase compared to 2020 and equal to the 2023 level. The non-FLAG emissions have grown stronger than the FLAG (Forest, Land, and Agriculture) emissions.

In 2024, Scope 3 FLAG emissions were the largest contributor to the total emissions, accounting for 56%. Scope 3 non-FLAG contributed 35%, while Scope 1&2 contributed only 9%.

The emissions of the meat and dairy supply chains (Scope 1 & 2 & 3) calculated by Profundo (CPF does not provide these data) amounted to 21.7 million tons of CO2e and contributed 55% to CPF's emissions.

CPF has set global emission targets based on the SBTi. This means a 30.3% reduction in FLAG emissions and 42% in E&I and non-FLAG emissions in 2030 (base year 2020), and 72% in FLAG and 90% in E&I and non-FLAG in 2050.[iii]

Status quo, with no protein transition, compared with three plant-based protein transition scenarios

To understand the potential contribution of a transition from animal-based proteins to plant-based proteins in the meat and dairy supply chains to climate emission reduction, Profundo has modelled

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[i] EBITDA = Earnings Before Interest, Tax, Depreciation and Amortisation.

[ii] The Science Based Targets Initiative (SBTi) offer companies a clear, actionable path to align emissions reductions with the Paris Agreement goals. Over 10,000 businesses worldwide are already involved.

[iii] FLAG = Forest, Land and Agriculture, E&I = Energy and Industrial.

three scenarios: a change from the current Base scenario with 100% animal-based proteins to scenarios with 30%, 50%, and 100% plant-based proteins.

The emission-reduction outcomes in the 30%, 50%, and 100% scenarios are material for CPF. Assuming that total protein production remains intact, the reduction in CO_2e emissions would be 4.9 million, 8.2 million, and 16.4 million tons of CO_2e emissions compared to the Base (no change) scenario. In context, these reductions are 13%, 21% and 42% of CPF's total emissions in 2024 (39.3 million tons).

The reduction in land use is also significant: 16% in the 30% scenario, 26% in the 50% scenario, and 52% in the 100% plant-based protein scenario. The numbers in square kilometres are impressive, reaching up to 15,631 km² in a 100% scenario, or approximately 1.6 million hectares.

Emission gap analysis: a plant-based protein transition is much more effective than on-farm emissions reduction measures

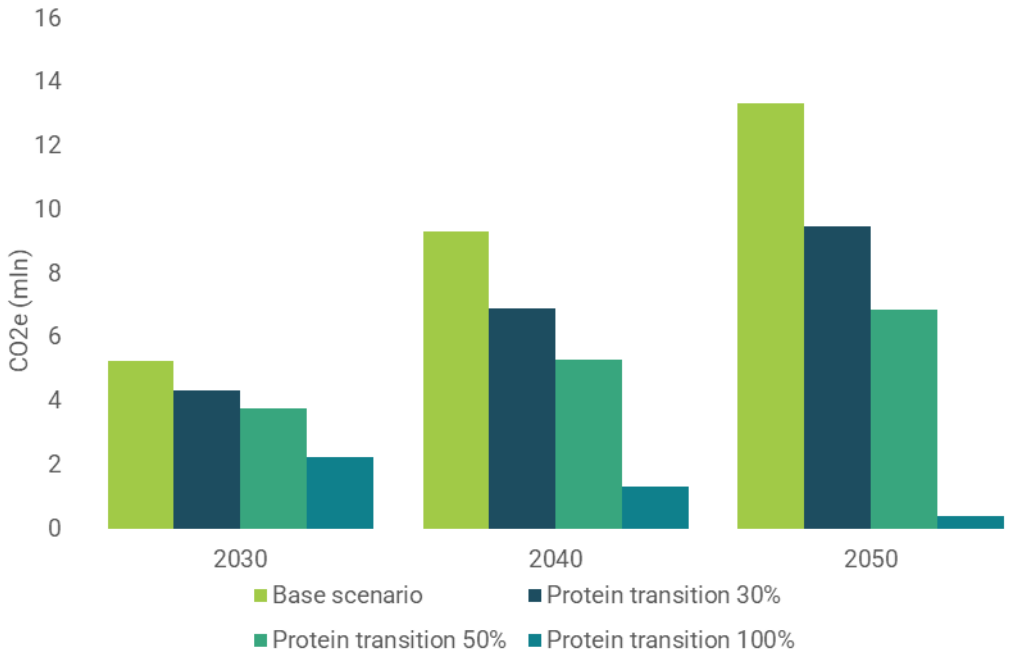
Suggestions that on-farm emission-reduction measures in the meat supply chain can replace reductions achieved through a protein transition were the reasons for including these emissions in the analysis. In a Base scenario with 100% animal-based proteins, these emissions-reduction measures would contribute 3.5 million tons of CO_2e, or 9% of CPF's total 2024 emissions. Thus, continuing with current meat and dairy activities, including CO_2e reduction measures, is insufficient to achieve SBTi-based targets.

Assuming that the large Scope 3 non-FLAG and Scope 1 & 2 E&I emissions will decline in line with SBTi targets, the Base scenario will still lead to a further increasing gap with the SBTi target: from 2.9 million tons in 2024 to 5.2 million tons of CO2e in 2030 and 13.3 million tons in 2050.

On the other end of the scale, the 100% protein transition scenario shows a reduction in the gap from 2.9 million tons in 2024, to 2.3 million tons in 2030, to 0.4 million tons in 2050.

For CPF, a 2050 neutral emission status cannot be achieved by the above-mentioned measures, and additional carbon sequestration/CC(U)S measures are needed.

Figure 1 Emission gap of CPF to SBTi targets compared to the 2020 base year*



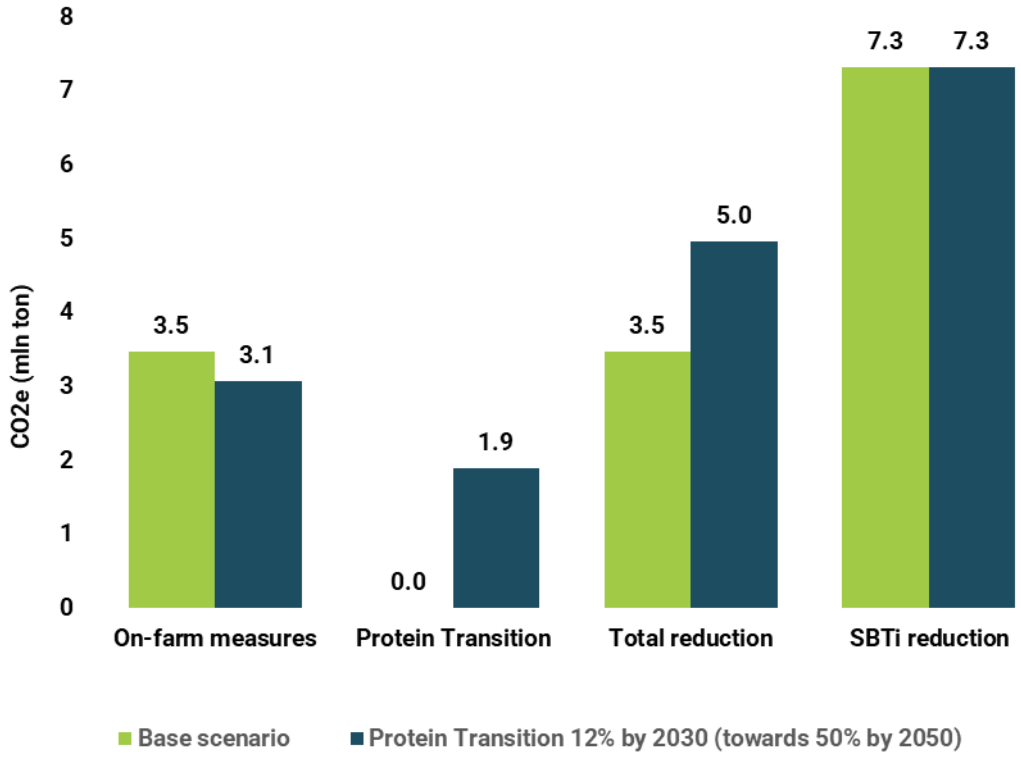
Source: Profundo protein transition analysis + on-farm emission-reduction measures in the remaining livestock business + Scope 1&2 E&I and Scope 3 non-FLAG reductions in line with SBTi targets (see Table 9); *) 36.4 million tons of CO_2e in 2020 base year.

On-farm measures in the livestock activities cannot close the 2030 emission gap

On-farm emission reduction measures alone (3.5 million tons of CO_2e in a Base scenario with no protein transition) do only partly (48%) contribute to the necessary SBTi reduction target (7.3 million tons) for Scope 3 FLAG emissions in 2030 (from the current emission total). CPF would need further reduction (1.9 million tons) from a protein transition (based on 12% of the portfolio plant-based in the gradual transition to 50% plant-based in 2050). With this scenario, CPF could achieve nearly 70% of the necessary Scope 3 reduction committed to. The remaining 30% of emissions to be reduced to meet the target would have to be achieved with carbon sequestration measures. This gradual shift to a scenario of 50% plant-based/50% animal-based product portfolio by 2050 could increase the value of CPF on the stock market by +169%, driven by lower costs and higher valuation multiples (see below).

To close the emissions gap and meet its own Scope 3 FLAG emissions by 2030, CPF needs to implement all on-farm measures and a more ambitious protein transition scenario of 23% plant-based product portfolio by 2030 (moving to 100% by 2050). This could enhance the market value by +342%.

Figure 2 Emission gap of CPF to SBTi Scope 3 FLAG targets 2030*



Source: Profundo protein transition analysis; *) Compared to 20220 and 2024's 22.2 million tons of Scope 3 CO_2e.

Plant-based protein transition adds to profits and reduce capital use and debt

The additional costs in a plant-based protein scenario include the construction and financing costs of new capacity in plant-based protein products, the annual costs of supporting farmers, who are suppliers in the meat companies' livestock chain, in changing their business models, and the additional marketing and information costs to incentivise a change in consumer demand from animal-based proteins to plant-based proteins.

The largest benefit stems from lower sourcing costs for raw materials, as plant-based proteins need much less crop input. Another significant benefit is the reduced need for infrastructure in production facilities for feed, farms, and slaughterhouses, as well as a reduction in livestock assets. On balance, this has a large positive impact on depreciation charges in the long term. Also, the abundant assets of the meat and dairy business can be sold. Financial debt can decline.

The plant-based protein scenarios would have a significant positive impact on net profit in the period to 2050. In a 30% transition scenario, the net profit impact would be +44% compared to 2024 net profit, or an annual positive impact to net profit of 1.5% from 2025 to 2050. In a scenario of 50% plant-based proteins to be achieved in 2050, the total net profit impact could be +85%, or 2.5% additional profit growth per year. On balance, the net debt is expected to decline in the protein scenarios. Therefore, due to lower net debt and higher EBITDA in the protein transition scenarios compared to the Base scenario, the Net debt/EBITDA ratio will improve compared to a Base/no-change scenario.

In contrast, the total financial impact in the Base scenario (no transition) would be -16% for CPF compared to the net profit of 2024. This net profit pressure is due to on-farm measures in the livestock supply chain. The important ratio indicating financial strength, the Net debt/EBITDA ratio,

would slightly deteriorate due to a lower EBITDA (Earnings Before Interest, Taxes, Depreciation, and Amortisation).

Further benefits from a plant-based protein transition include CPF's reputation, as its environmental footprint is expected to have a positive impact on its ESG (Environmental, Social, and Governance) ratings. This could positively impact its valuation multiple, such as the price/earnings ratio, on stock exchanges, as high ESG ratings are becoming increasingly relevant for (international) investors and their portfolios. The potential benefits of carbon sequestration and the societal benefits of CO_2e reduction have not been calculated for CPF, as these will not directly affect CPF's net profit.

The valuation of CPF could dramatically increase due to the protein transition scenarios

The higher net profit and the lower net debt in the transition scenarios could have a material impact on the value of CPF on the stock market. Important valuation ratios are 1) the ratio Enterprise Value (EV) to EBITDA, and 2) the Price/Earnings ratio.

If in the transition scenarios these ratios would remain in line with the current EV/EBITDA ratios for CPF in the Base scenario, a 30% protein transition could enhance the market value by 119%. In a 50% and 100% transition, this would be 198% and 402%, respectively. By applying this valuation methodology to the Price/Earnings ratio, the difference would be even higher. The respective value enhancements in the protein transition scenarios would be 71%, 119% and 242%.

The differences between the Base scenario and the protein transition scenarios would become even larger when the reputation value theory is introduced, linked to improved ESG performance. Then, after averaging the implicit EV/EBITDA and Price/Earnings effects and adding the reputation impact, the protein transition scenarios could enhance the total market capitalisation by 101% to 342%, while the Base scenario would face a 30% value reduction.

CPF's feedback on the report

"1. CPF's key strategy to achieve the FLAG SBTi targets is to implement a standardized traceability platform and collaborate with our suppliers and partners to ensure deforestation-free sourcing. Furthermore, in line with the updated SBTi and GHG Protocol standards, carbon removal will play a crucial role in achieving these targets. Therefore, we will update our strategy once the new standards are officially published.

2. We noticed that your report states that there is no publicly available information on CPF's investment in alternative protein. For more information on CPF's commitment to achieving our targets, please refer to CPF's Journey to Sustainability, Passion Towards Net Zero at the link: https://www.cpfworldwide.com/en/sustainability/report/CPF_NetZero2024_EN ".

Abbreviations

30% (protein) transition	Scenario with 30% plant-based proteins in 2050
50% (protein) scenario/transition	Scenario with 50% plant-based proteins in 2050
100% (protein) scenario/transition	Scenario with 100% plant-based proteins in 2050
CO_2e	Carbon dioxide equivalent
EBITDA	Earnings Before Interest, Tax, Depreciation, and Amortisation
Enterprise Value	Market capitalisation + Net debt
EV/EBITDA	Enterprise Value / EBITDA ratio
Market capitalisation	Number of outstanding shares x share price
Net debt	Gross debt minus Cash
Net debt/EBITDA ratio	Net debt divided by EBITDA
Operating profit	(Operating) revenues minus operating expenses
NA	Not available
NDC	Nationally Determined Contributions
Net profit	Profit after payment of corporate tax
Price / Earnings ratio	Market capitalisation divided by Net profit

Introduction

Madre Brava's mission is to protect people, animals and the planet by leading a material shift from animal-based food to more plants in food. This research is part of Madre Brava's broader strategy to align the protein industry with a 1.5 °C scenario by reducing the role of livestock and scaling up sustainable proteins, including plant-based and alternative proteins.

Madre Brava aims to make an alternative business case for Thai leading and influential animal-based protein companies with presence in Thailand and in other parts of the world: Charoen Pokphand Foods (CPF). The report focuses on its large chicken, pork and dairy activities, including animal feed and the end products for food retailers and food markets.

Chapter 1 describes CPF, its emissions in chicken, pork and dairy. It examines the company's climate targets. It also calculates the land use for the chicken, pork and dairy activities.

The next step (Chapter 2) is to calculate the emission and land use benefit of a transition to plant-based scenarios. Three scenarios have been introduced: a 30%, 50%, and a 100% transition. The outcomes of these scenarios are compared with the Base scenario.

Based on the calculated emission footprints in the four scenarios (including the Base scenario), a gap analysis (Chapter3) shows how these scenarios can reduce the gap between CPF's emissions and its own climate targets. The calculation is executed, excluding and including additional measures on the livestock farms to reduce emissions. This is done because an argument could be that the additional measures are a good substitute for a protein transition.

The next step (Chapter 4) is to calculate the costs and benefits of the protein transition scenarios. This includes the costs of setting up new production capacity for plant-based protein products, the annual financial support to farmers who need to change their business model, and the additional marketing and information expenditures needed to change consumers' preferences. Also, the cost of additional on-farm measures in the livestock supply chain is calculated, as this option is sometimes brought forward as an alternative to a plant-based protein transition.

The last chapter summarises the costs and benefits and analyses their impact on CPF's net profit and net debt/EBITDA ratio. Net profit and Net debt/EBITDA are crucial ratios for investors and creditors.

1

CPF's climate emissions and targets

This chapter examines Charoen Pokphand Foods' (CPF) business profile, its climate emissions (including carbon dioxide and methane) and its emission reduction commitments. The focus of this report is on CPF's meat and dairy activities.

1.1 Charoen Pokphand Foods (CPF)

Charoen Pokphand Group (CP Group), the parent company of CPF, is a diversified conglomerate engaged in industries such as agriculture, telecommunications, marketing, distribution, logistics, international trading, petrochemicals, property and land development, crop integration, insurance, automotive, and pet food. Headquartered in Bangkok, CP Group generates over € 75 billion (US$ 82 billion) in revenue (2024) and employs 452,794 people. Its operations include 330 production plants, 91 research centres, 1,075 livestock and aquaculture farms, 168 Makro branches, 14,630 7-Eleven stores, and 2,605 Lotus stores.[1]

CPF operates integrated agro-industrial and food businesses, including pigs, broilers, layers, ducks, shrimp and fish.[2] Revenues amounted to € 15.2 billion (TBH 580,747 million) in 2024, with a gross profit margin of 14.6% and net profit of € 484 million (TBH 19,558 million). Of total revenue, 37.4% was generated in Thailand, including production for export. Other important production markets are Vietnam (21%) and China (6%).[3] Of revenues in 2024, 88.6% came from Livestock (including feed, farming, and food products), and 11.4% from Aquaculture.[4]

Regarding plant-based and alternative proteins, CP Group states:

"Charoen Pokphand Group adheres to a sustainable production approach, focusing on developing high-quality protein sources at affordable prices, as well as future food that is good for health and environment, such as plant-based proteins and organic farming products. The Group also advocates for developing carbon footprint-certified products or low-carbon products to provide consumers with more options in the collective effort to reduce the climate change impacts."[5]

Furthermore, in Thailand CPF launched its Meat Zero-branded products in 2022, which are sold at, among other places, 7-Eleven, Lotus's, Makro, and CP Fresh Mart.[6] However, it remains unclear what the size of the brand is. In partnership with Future Meat Technologies, a cultivated meat innovator, the company is developing hybrid cultured meat tailored specifically for Asian consumers. Beyond product innovation, CPF invests in the future of alternative proteins by mentoring promising researchers, including students from Chulalongkorn University who won the grand prize at the 2021 ASEAN Food Innovation competition.[7]

1.2 CPF's own reporting on climate emissions and its targets

CPF reports its scope 1, 2 and 3 emissions and reduction targets, which are SBTi (Science-Based Targets Initiative)-validated.

Total Scope 1, 2, and 3 emissions amounted to 39.3 million CO2e in 2024, an 8% increase compared to 2020 and equal to the 2023 level. The non-FLAG emissions have grown stronger than the FLAG (Forest, Land, and Agriculture) emissions.

In 2024, Scope 3 FLAG emissions were the largest contributor to emissions, accounting for 56%. Scope 3 non-FLAG contributed 35%, while Scope 1&2 contributed only 9%.

The emissions of the meat and dairy supply chains (Scope 1&2&3) calculated by Profundo amounted to 21.7 million tons of CO_2e (see Table 3) and contributed 55% to CPF's emissions.

Table 1 CPF: Emissions 2020-2024

CO_2e (million ton)	**2020**	**2021**	**2022**	**2023**	**2024**	**% change 2020 to 2024**	**% contribution in 2024**
Scope 1&2 E&I	2.7	2.8	2.6	2.00	2.6	-3.7%	7%
Scope 1 FLAG					0.6		2%
Scope 3 non-FLAG	11.5	11.5	13.2	13.6	13.9	20.9%	35%
Scope 3 FLAG	22.2	22.9	23.0	23.8	22.2	0.0%	56%
Total	36.4	37.2	38.8	39.3	39.3	8.0%	100%
Scope 3 FLAG as % (as reported by CPF)	61%	62%	59%	61%	56%		
Climate emissions chicken, pork, dairy as calculated by Profundo*					21.7		55%
Other emissions					17.6		45%

Source: Profundo based on CPF; *) includes FLAG and processing emissions

The company's targets are summarised in Table 2. SBTi targets provide companies with a clear, actionable path to align their emissions reductions with the Paris Agreement goals. Over 10,000 businesses worldwide are already involved.[8]

Table 2 CPF global emission reduction targets

Target type	Scope / Category	Reduction target	Target year	Base year	Notes
Overall	All scopes	Net-zero emissions	2050	2020	Across full value chain
Near-Term	Scope 1 & 2 (Energy & Industrial)	-42%	2030	2020	Includes land-related emissions/removals from bioenergy feedstocks
Near-Term	Scope 3 (Non-FLAG)	-42%	2030	2020	Includes purchased goods/services, capital goods, fuel & energy-related activities, transport (upstream/downstream), waste, business travel, commuting, processing, use, end-of-life, franchises
Near-Term	Scope 1 & 3 FLAG	-30.3%	2030	2020	FLAG = Forest, Land & Agriculture emissions
Near-Term	Deforestation	Zero deforestation	2025	—	Primary deforestation-linked commodities
Long-Term	Scope 1 & 2 (Energy & Industrial)	-90%	2050	2020	Includes land-related emissions/removals from bioenergy feedstocks
Long-Term	Scope 3 (Non-FLAG)	-90%	2050	2020	Same Scope 3 categories as near-term
Long-Term	Scope 1 & 3 FLAG	-72%	2050	2020	Includes FLAG emissions/removals

Source: Science Based Targets (n.d.), "Target dashboard", online: https://sciencebasedtargets.org/target-dashboard, viewed in August 2025.

Actions planned by the company to reduce its emissions by 2030 include:[9]

- Renewable energy (3.4% reduction target):
  - Use biomass, biogas, and solar energy.
  - Transition to cleaner fuels.
  - Adopt environmentally friendly refrigerants.
- Smart factory & building technologies (3.3% of reduction target)
- Product Development (2.2% of reduction target):
  - Develop environmentally friendly animal feed.
  - Use sustainable packaging.
- Supply chain (71.7% reduction potential):
  - Ensure zero deforestation sourcing.
  - Prevent additional land-use change.
  - Improve logistics efficiency.
  - Collaborate closely with suppliers on sustainability practices.
- Waste reduction (4.5% of reduction target):
  - Achieve zero waste to landfill.
  - Eliminate food waste.
  - Overall Impact

- Target: Reduce 12.6 million tons CO_2e by 2030.

Furthermore, methane capture is part of CPF's actions as well, but no separate targets are included. No evidence was found that the company is expanding the share of alternative proteins in its portfolio, nor production figures of the current portfolio.

While CPF does produce and distribute alternative protein products, no planned investments were found.

1.3 Methodologies to calculate climate emissions and land use

As the analysis focuses on CPF's emissions and land use by its chicken, pork and dairy activities, and CPF does not report on these specifically, Profundo needed to introduce widely accepted methodologies. These are explained in this first section.

In Chapter 2, the transition scenarios with plant-based protein alternatives are discussed, and the methodology of their emissions and land use is included in this section already.

1.3.1 GHG emissions

The Global Livestock Environmental Assessment Model (GLEAM), developed by the FAO, quantifies global livestock production and its environmental impacts, particularly greenhouse gas (GHG) emissions. Key emission sources include enteric fermentation, pasture expansion, and feed production. The latest version, GLEAM 3.0 (2022), is based on 2015 FAO livestock data and emission factors aligned with the IPCC Sixth Assessment Report (AR6).[10]

For this analysis, GLEAM 3.0 emission factors for pork and chicken were applied to FAO 2021 production volumes.

Regarding plant-based protein, legumes such as soybeans, peas, and lupines form the basis of most meat substitutes. Life Cycle Assessments (LCAs) show that processing intensity and protein concentration strongly influence their GHG and water footprints.[11]

Because no comprehensive database exists, GHG estimates for meat alternatives (e.g., pulses, soy, fermentation-based products) were compiled from multiple scientific studies and industry LCAs, which may differ in assumptions such as GWP values and system boundaries.

An adequate supply of high-quality protein is a crucial component in the discussion around access to sufficient healthy food and alternative products' role in reducing meat consumption. Therefore, the estimates presented in this analysis are based on protein values.

1.3.2 Land use

Mean values from Poore and Nemecek (2018) were used to calculate land use by type of meat, pulses, and tofu, while mycoprotein and fermentation-based alternatives rely on land-use estimates reported in product-specific LCAs.

1.3.3 Plant-based alternatives

For the two protein transition scenarios used in this report for the meat activities, a mix of alternative products was used, including pulses, tofu, mycoproteins, and fermentation-based products. Scenarios assume a combined replacement strategy, rather than substitution with a single product. For dairy, a soy-based alternative is used.

This study uses Quorn mycoprotein and Impossible fermentation-based products for 30% (15% each), and the remaining 70% is covered by plant-based alternatives such as pulses, tofu, and products such as CP's Meat Zero.

1.3.4 Data limitations

The calculations in this report draw from a combination of peer-reviewed studies, independent LCAs, and company-published data, which sometimes lack full methodological transparency. Due to the absence of comprehensive, consistent data and company disclosures, multiple sources were combined. This introduces some uncertainty, so the results should be viewed as approximations based on the best available data, rather than precise figures. Key considerations include:

- GHG emissions are based on GLEAM 3.0 GWP100 factors. Differences with other studies may arise from the use of AR6-based GWP revisions or GWP100 versus GWP20 values.
- Land use datasets lack consistent regional breakdowns, and the use of mean values can lead to over- or underestimation.
- Meat volumes were standardised using conversion factors.
- Company production data are rarely disclosed. Estimates are based on production capacity, geographical sales revenue distribution and media articles.

1.4 CPF's climate emissions from chicken, pork, and dairy products by Profundo

CPF's estimated emissions from the production of chicken, pork and dairy products are shown in Table 3. The 21.7 million climate emissions are

These emissions do not include the aquaculture

Table 3 CPF – estimated emissions from chicken, pork, dairy (tons CO2e)

Animal	Heads/year (2023, million)	CH_4	CO_2	N^2O	Total annual emissions
Chicken*	685	65,250	2,683,421	570,941	3,319,612
Pork	18	7,014,813	8,119,991	1,458,222	16,593,026
Dairy*	589,559*	1,232,179	1,232,179	229,928	1,809,948
Total		**8,312,243**	**11,151,252**	**2,259,090**	**21,722,585**

Note: * tons of production 2024, in milk and yoghurt from Thailand, domestic and export.

Source: WATTPoultry (2024), *Asia Top Broiler Producers*; CPF (2025), *Annual Report 2024*, p.4, 25; *FAO* (2023), "GLEAM v3.0 dashboard",viewed on 6 August 2025. *) For instance on the emissions: 56% of emissions of chicken meat are attributable to feed cultivation and production (CH4, CO2 and N2O). LUC (land use change): soy and palm emissions are separately reported and account for 10%.

2

Protein transition paths and footprint

This chapter calculates CPF's reduction opportunities in CO_2e and land use from three protein transition scenarios, compared to a Base scenario.

2.1 Introduction

Chicken, pork and plant-based and other and dairy meat alternatives have very different climate and land use footprints. The footprint calculations are based on the assumption that by replacing chicken, pork and dairy, the alternatives provide the same amount of protein.

The following table gives the crucial parameters for the calculation. The numbers show that the CO_2e per 100 grams of protein for pork is significantly higher than for chicken and for the plant-based alternative mix. Also, the land use per 100 grams of protein is the highest for pork. The same outcomes are visible for dairy.

The methodology for calculating the climate emissions and land use for chicken, pork, and plant-based alternatives is described in the section 1.3.

Table 4 Protein, CO_2e, and land use of chicken, pork, dairy and alternatives

	Protein (100 gram) per kg material (carcass for chicken and pork)	CO_2e per 100 gram protein ($kgCO_2eq$)	Land use per gram of protein (m^2/100 g)
Chicken	1.43	2.86	6.43
Pork	1.31	8.23	8.59
Average of chosen plant-based alternative mix*	1.27	1.44	4.03
Dairy (in milk equivalents)	1.58	1.94	5.65
Milk replacement/soy drink	0.38	0.79	1.75

Source: Profundo, based on Poore, J. and T. Nemecek (2018), "Reducing food's environmental impacts through producers and consumers," Science, Vol. 360: 987–992; *FAO* (2023), "GLEAM v3.0 dashboard", viewed on 6 August 2025. Walther B, Guggisberg D, Badertscher R, Egger L, Portmann R, Dubois S, Haldimann M, Kopf-Bolanz K, Rhyn P, Zoller O, Veraguth R, Rezzi S. (2022), "Comparison of nutritional composition between plant-based drinks and cow's milk", Front Nutr. 28;9; CarbonCloud (n.d.), "Soy milk.

*) Average of chosen plant-based alternative meat mix: Combined scenario: Pulses-35%, Tofu-35%; Fermentation based (Impossible)-15%, Mycoprotein based (Quorn mince) -15%), see 1.3.3.

2.2 Scenarios

These parameters have been applied to three scenarios: a change from the current Base scenario (100% animal-based proteins) to scenarios of 30%, 50% and 100% plant-based proteins. The calculation is made for the total production of chicken, pork and dairy of CPF.

The emission reduction outcomes in the 30%, 50% and 100% scenarios are material in the context of CPF's total 2024 emissions (39.3 million tons of CO_2e). Assuming that total protein production remains intact, the reduction in CO2e emissions would be 4.9 million, 8.2 million, and 16.4 million in CO2e emissions compared to the Base (no change) scenario. In context, these reductions are 23%, 38% and 76% of CPF's total emissions in 2024.

The reduction in land use is also significant: 16% in the 30% scenario, 26% in the 50% scenario, and 52% in the 100% plant-based protein scenario. The numbers in square kilometres are impressive, reaching up to 15,631 km² in a 100% scenario, or approximately 1.6 million hectares.

Table 5 Table 4: CPF's Base Scenario and Three Alternative Scenarios — CO_2e Emissions and Land Use

	Base scenario	30% scenario	50% scenario	100% scenario
Division in protein				
Meat-dairy	100%	70%	50%	0%
Alternative	0%	30%	50%	100%
Protein production (tons)				
Chicken	116,227	81,359	58,114	0
Pork	201,542	141,079	100,771	0
Total	317,769	222,438	158,884	0
Alternative	0	95,331	158,884	317,769
Tons of equivalent alternative protein products - meat	0	752,881	1,254,802	2,509,604
Dairy	93,430	65,401	46,715	0
Dairy Alternative		28,029	46,715	93,430
Tons of equivalent alternative product - dairy		117,511	195,852	391,703
Total Tons of alternative products meat and dairy	**0**	**870,392**	**1,450,654**	**2,901,307**
CO_2 emission (ton)				
Chicken	3,319,612	2,323,728	1,659,806	0
Pork	16,593,026	11,615,118	8,296,513	0
Dairy	1,809,948	1,266,963	904,974	0
Total	21,722,585	15,205,810	9,956,319	0
Alternative Meat	0	1,369,186	2,281,977	4,563,954

	Base scenario	30% scenario	50% scenario	100% scenario
Alternative Dairy	0	222,453	370,756	741,511
GRAND TOTAL CO_2e emissions	***21,722,585***	***16,797,449***	***13,514,025***	***5,305,465***
Reduction versus Base scenario		***4,925,136***	***8,208,560***	***16,417,120***
% reduction		***23%***	***38%***	***76%***
Land use (km^2)				
Chicken	7,475	5,233	3,738	0
Pork	17,321	12,124	8,660	0
Dairy	5,277	3,694	2,638	0
Total	30,072	21,051	15,036	0
Alternative		3,843	6,405	12,810
Alternative Dairy		489	816	1,631
GRAND TOTAL land use (km^2)	***30,072***	***25,383***	***22,257***	***14,441***
Reduction versus Base scenario		***4,689***	***7,816***	***15,631***
% reduction		***16%***	***26%***	***52%***

Source: Profundo estimates

Protein growth assumptions

The current report assumes that towards 2050, no further growth will occur in the total protein output of CPF's global activities. This assumption is based on the lack of data and projections for the 2026-2050 period of how CPF will position itself for further growth through capital investments and marketing initiatives.

In the global market, the demand for chicken, pork, and dairy products is expected to continue growing due to population growth and increasing protein intake per capita. CPF might also experience further growth if it maintains its market share.

As a consequence of further growth, the emissions gaps with respect to SBTi targets for 2030 and 2050, as calculated in the next Chapter, will become larger.

3

Gap analysis

The gap analysis includes the protein transition scenarios compared to the reductions needed to achieve the SBTi targets in 2030 and 2050.

3.1 Introduction

The preceding two chapters provide data on CPF's emissions and land use, and the potential for reducing Scope 3 FLAG emissions and land use through three protein transition scenarios.

This chapter elaborates on the gap of the three protein scenarios with the SBTi targets for 2030 and 2050.

3.2 CPF's reduction targets based on SBTi and its own emissions reporting

The company aims to achieve a net-zero status by 2050. In the next table, the SBTi reduction targets are applied for 2030 and 2050, while the 2040 target is the average of the 2030 and 2050 targets. It is interesting to note that there is still an additional reduction of 7.6 million tons of CO_2e to be achieved by 2050 to reach the net-zero position. Measures like carbon sequestration through reforestation or Carbon Capture (Utilisation) and Storage (CC(U)S) can be of help, but are still highly uncertain, also due to technical challenges.

The last line in the table shows the outcomes when the SBTi targets are achieved, excluding the unknown line.

Table 6 CPF: Emission targets 2030 and 2050

CO2e (million ton)	2020	2024	2030	2040	2050	Target and year
Company target /SBTi target - Global						
Scope 1&2 E&I	2.7	2.6	1.6	0.9	0.3	-42% 2030; -90% 2050
Scope 3 non-FLAG	11.5	13.9	6.7	3.9	1.2	-42% 2030; -90% 2050
Scope 1&3 FLAG	22.2	22.8	15.5	10.8	6.2	-30.3% 2030; -72% 2050
Unknown / additional measures required	0	0	0	-3.8	-7.6	Unknown
Total	36.4	39.3	**23.7**	**11.9**	**0.0**	Base year 2020 / net-zero
Total based on SBTi (excluding unknown)	36.4	39.3	**23.7**	**15.7**	**7.6**	SBTi targets

Source: Profundo based on CPF; 2020 is the base year for SBTi targets

3.3 CPF: On-farm measures are not sufficient for reaching climate targets

Some meat companies say that the reduction in animal-protein activities is "a good alternative to, or substitute for a protein transition."[12]

According to McKinsey, a more efficient farm system can only lead to a limited reduction of GHGs. Globally, sustainable food production, including expansion and adoption of practices and technologies that can reduce emissions while meeting food (and feed) requirements, can generate 2.3 billion tons of emissions, for a total of 14.4 billion tons of climate emissions from agriculture.[13] That is 16.0%. McKinsey's abatement database is based on 10 sectors across 21 world regions and has a 2030 perspective (see further in section 4.4.4).[14] This 16% translates to on-farm emission reductions of 3.5 million tons of CO_2e in the meat and dairy supply chain by 2050.

In the Base scenario with 100% animal-based proteins, the on-farm emissions reduction measures would contribute 3.5 million ton CO2e, or 9% of CPF's total 2024 emissions. This does not close the gap to the 2030 and 2050 targets (see Observation 2 in Table 7).

Thus, in such a Base scenario, with the assumption that emissions from chicken, pork, and dairy (C+P+D) will stabilise in the coming years, CPF can very difficult achieve its SBTi targets in 2030 and 2050 through on-farm measures, To achieve the target in 2050, the emissions outside the meat and dairy business should decline from 17.6 million in 2024, to -10.6 million tons of CO_2e in 2050. This is a decline of 28.2 million tons between 2024 and 2050. The decline should be 69% between 2024 and 2030, and 160% between 2024 and 2050.

A large part of the 17.6 million 'other emissions' (2024) is in Scope 3 non-FLAG, and a reduction in these emissions is largely outside CPF's control (like cooking methods, commuting; see Table 2).

It is worth noting that CPF has shown a reduction in Scope 1&2 E&I emissions from 2020 to 2024, but not in Scope 3 non-FLAG. Furthermore, in the coming years, population growth and increased per capita spending power may lead to a larger chicken and pork market, particularly in developing markets such as Thailand and Southeast Asia, resulting in higher volume sales by CPF. This could lead to a further increase in emissions.

Table 7 CPF: Emission gap in a Base scenario and including on-farm measures

CO_2e (million ton)	2020	2024	2030	2040	2050
Observation 1					
Chicken, pork and dairy emissions	NA	21.7	21.7	21.7	21.7
On-farm emission change	NA	NA	-3.5	-3.5	-3.5
Other emissions	NA	17.6	5.5	-2.6	-10.6
% change since 2024			*-69%*	*-115%*	*-160%*
Total emissions based on SBTi	36.4	39.3	23.7	15.7	7.6
Observation 2					
Emissions in the Base scenario with on-farm emission measures	36.4	39.3	35.8	35.8	35.8
Gap to SBTi targets	NR	NR	12.1	20.2	28.2

Source: Profundo; NA = Not available; NR = not relevant; model assumes stable production in 2024 to 2050

3.4 Emission reduction based on protein transition scenarios and gap to SBTi targets

In this section, all measures to reduce CPF's climate emissions (excluding its aquaculture business) are summarised and calculated. The measures include the protein transition, on-farm measures, and Scope 1&2 measures. The reduction in the large Scope 3 non-FLAG emissions has been given the benefit of the doubt. These emissions (including purchased goods/services, capital goods, fuel & energy-related activities, transport upstream/downstream, waste, business travel, commuting, processing, use, end-of-life, franchises) is assumed to decline by 42% from 2024 to 2030, and by 90% in 2050, in line with SBTi targets.

Table 8 reveals the emissions in the various protein transition scenarios in meat and dairy (A), potential on-farm emissions reduction measures (B), and other emissions (C). The Base scenario still has 21 million tons of CO_2e in 2050, while a 100% protein transition has 8 million tons of emissions.

Table 8 CPF: Emission reduction scenarios

CO_2e (million ton)	**2024**	**2030**	**2040**	**2050**
A - Emissions from protein transition in chicken, pork and dairy chains				
Base scenario	21.7	21.7	21.7	21.7
Protein transition 30%	21.7	20.6	18.7	16.8
Protein transition 50%	21.7	19.8	16.7	13.5
Protein transition 100%	21.7	17.9	11.6	5.3
B - On-farm measures emission reduction in livestock				
Base scenario		3.5	3.5	3.5
Protein transition 30%		3.2	2.8	2.4
Protein transition 50%		3.1	2.4	1.7
Protein transition 100%		2.7	1.3	0.0
C - Other emissions (other than for chicken, pork, dairy)				
Scope 1&2 E&I	2.6	1.6	0.9	0.3
Scope 3 non-FLAG	13.9	8.1	4.7	1.4
Other	1.1	1.1	1.1	1.1
Sub-total	17.6	10.7	6.7	2.7
D - Total emissions (= A - B + C)				
Base scenario	39.3	29.0	25.0	21.0
Protein transition 30%	39.3	28.1	22.6	17.1
Protein transition 50%	39.3	27.5	21.0	14.5
Protein transition 100%	39.3	26.0	17.0	8.0

Source: Profundo estimates, based on preceding tables on protein transition, McKinsey, and CPF's stated emissions

Assuming that the large Scope 3 non-FLAG and Scope 1 & 2 E&I emissions will decline in line with SBTi targets, the Base scenario will still lead to a further increasing gap with the SBTi target: from 2.9 million tons in 2024 to 5.2 million tons of CO2e in 2030 and 13.3 million tons in 2050.

On the other end of the scale, the 100% protein transition scenario shows a reduction in the gap from 2.9 million tons in 2024 to 0.4 million tons in 2050.

CPF can hit the 2050 SBTi targets in 2050 through a 100% protein transition. For CPF, a 2050 neutral emission status cannot be achieved solely through the above-mentioned measures, and additional carbon sequestration/CC(U)S measures are required.

Table 9 CPF: Gap analysis for 2030-2050 versus SBTi-based targets

CO_2e (million ton)	**2020**	**2024**	**2030**	**2040**	**2050**
Emission based on SBTi targets*	36.4	39.3	23.7	15.7	7.6
Emission gaps versus SBTi-based targets					
Base scenario		2.9	5.2	9.3	13.3
Protein transition 30%,		2.9	4.3	6.9	9.5
Protein transition 50%		2.9	3.7	5.3	6.9
Protein transition 100%		2.9	2.3	1.3	0.4

Source: Profundo estimates: *) assuming stable protein production from 2024 to 2025.

In these scenarios, the protein transition paths in meat and dairy have developed as follows, which shows that in the path to, for instance, 50% protein transition to be achieved in 2050, the share of plant-based proteins is 12% in 2030, and 31% in 2040:

Table 10 CPF: Protein transition paths in 2024-2050

%	**2020**	**2024**	**2030**	**2040**	**2050**
Base scenario	0%	0%	0%	0%	0%
Protein transition 30%	0%	0%	7%	18%	30%
Protein transition 50%	0%	0%	12%	31%	50%
Protein transition 100%	0%	0%	23%	62%	100%

Source: Profundo estimates; % reflects the percentage of proteins generated by plant-based products.

4

Costs and benefits of the protein transition

This chapter calculates the costs and benefits of the protein transition for CPF and compares them to a Base scenario. The costs include, for instance, the construction of new capacity and the need to develop new markets, as well as financial support to farmers who need to change their business models. The benefits, for instance, include lower interest rates and potentially higher valuations of more sustainable activities.

4.1 Introduction and methodology

The costs of a protein transition are as follows:

- The investment in new capacity of plant-based proteins and the accelerated depreciation of the capacity of animal-based proteins.
- Marketing costs to change the demand side from meat to plant-based protein products.
- Financial support to suppliers to join the transition.
- Measures on the farms (on-farm measures) to reduce CO_2e emissions of the remaining meat business.

The analysis includes the marginal cost per ton of CO_2e reduction, which could be important if the most efficient/optimal action needs to be chosen. This chapter does not include measures to reduce non-FLAG emissions, including renewable energy. These measures could further reduce emissions and incur relatively low costs.[15] However, including these would 'dilute' the narrative on the protein transition.

Benefits of a protein transition include:

- Potentially lower interest rates on loans and/or better access to capital.
- Impact on reputation value.
- Impact on ESG rating.
- A higher valuation multiple of the activities (on stock exchanges).

This chapter discusses the most important changes to the CPF's Profit and Loss Accounts and Balance Sheets.

4.1.1 Methodology

In this report, pro forma calculations have been made to assess the various impacts. This means that the 2024 revenues, EBITDA (Earnings Before Interest, Tax and Amortisation costs), net profit and debt are the reference financial numbers for the total impact analysis of a 30%, 50% and 100% transition.

As a consequence, the total annual impact of a 100% transition, for instance, will be calculated. Although the transition will be finalised in 2050, comparing the impact on 2024 numbers provides a transparent outcome. The calculated impact will be in addition to the organic growth, decline, or stabilisation a company is expected to experience between 2024 and 2025.

When all factors have been calculated, the final section calculates the additional financial impacts on CPF per year, as the transition is a gradual path from 2024 to 2050.

4.2 Strategic reasons to make the protein transition

At this moment, a meat company like CPF, producing chicken and pork, benefits from crucial advantages in its home country, Thailand, and in other important regions of Southeast and East Asia. Of CPF revenues, 81% is generated in Southeast and East Asia (of which 32% point in Thailand), and 14% in Europe and 5% in the Americas:

- Growing demand for protein products through increasing population and rising income per capita in Thailand and in the region.
- The availability of an ample supply of agricultural commodities from domestic production (grains) and imports (soy).
- The availability of a large labour force with relatively low wages (from a Western perspective) creates an export benefit for labour-intensive meat processing.
- A dynamic import and export environment located at the ocean/sea.
- Government-supported business environments and a good education level.

In the transition from animal-based to alternative and plant-based protein products, the automation level could increase, but a large supply of agricultural products is still required. Additionally, the factories may require a large workforce to develop, process, package, and distribute the end products.

For CPF, Thailand is a good starting point as it has a strong ecosystem and a supporting industry for manufacturing food products. The country has a highly skilled labour force and food companies with a reputation for quality and reliability. Food scientists and technologists are readily available. There are numerous Thai universities offering programs in food science and technology. Thailand is a major agricultural country and has extensive experience in growing crops. The location of Thailand in Asian markets is also an advantage.[16]

The Thai agricultural sector is heavily focused on rice. However, sunflower seeds, soybeans, potatoes, and wheat are also produced, which can be used as ingredients for plant-based protein foods, and which areas can be increased.[17]

This analysis of the competitive edge of the Thai business environment is supported by the intentions of some companies. Due to rising costs caused by the COVID-19 pandemic, plant-based meat alternative companies were looking to relocate their production to lower-cost countries. Thailand, with its abundance of suitable raw materials, has been considered an attractive choice; however, the execution of these considerations has been marginal.

4.3 The opportunity for a transition in South East Asia and rest of the world

A 2023 survey (1500 consumers) showed that while 76% of Thai consumers eat meat, 67% of the population wants to reduce their intake because of health reasons.[18] In 2022, Thailand's meat substitute market reached US$ 39.1 million, and was projected to grow at a CAGR of 14% between 2022 and 2027.[19]

Of survey respondents in Indonesia, Malaysia, Singapore, Thailand, the Philippines, and Vietnam, 42% want to try to eat more plant-based meat. Almost half of respondent ranks affordability as one of their top three barriers to consuming more plant-based meat.[20] Survey respondents also indicated that 51% are meat-eaters, 38% are flexitarians, and 2% are vegetarians or vegans. In China, Singapore, South Korea, and Japan, the meat-eating percentage is between 60% and 91% in this survey. In Thailand, 47% have consumed, and 42% have purchased plant-based meat.[21]

4.4 The costs of the protein transition

The costs and benefits calculated in this report, will be compared to the recent key financial data of CPF (Table 11).

Table 11 CPF: key financial data

€ million (Dec)	2022	2023	2024
Revenue	16,662	15,570	15,214
Gross profit	2,221	1,627	2,228
Depreciation and Amortisation	874	883	896
Operating profit	729	142	907
Pre-tax	453	-173	400
Net profit	364	-155	484
EBITDA	1,603	1,025	1,803
Property, plant and equipment (PPE) + biological assets	8,942	8,444	8,942
Net debt	13,590	13,679	14,070
Net debt/EBITDA	8.5	13.3	7.8

Source: Profundo based on FactSet.

4.4.1 Marketing and information costs

Section 4.3 provided input that there is a market opportunity for plant-based proteins; however, the market is small and still needs to grow. Marketing and information expenditures might be needed to change consumer behaviour from animal-based proteins to plant-based protein products.

At this moment, CPF's revenues in its total business of animal-based protein and plant-based alternative proteins are close to 100% and 0%, respectively. The consequences of a protein transition for CPF are as follows:

- The 30% and 50% plant-based scenarios mean a substantial reduction in the current animal-based proteins and a very strong growth in plant-based protein products. The 100% plant-based scenario requires an even stronger growth in plant-based protein products.
- The time period is still long, from 2025 to 2050.
- The significant shift in CPF's protein portfolio requires extra marketing and information expenditures to convince consumers

A marketing rule is to spend 5% to 20% of revenues on marketing, depending on whether you want to sustain or grow the product/category. Generally, 5-10% is enough to sustain growth, but 11% to 20% is needed for expansion. The marketing expenditures differ by sector. Consumer goods might need 18% marketing as a percentage of revenues,[22] as Forbes confirms.[23] These are expenses in the whole chain, to be divided between producers and food retailers.

In 2024, CPF's selling and administrative expenses amounted to 8.7% of sales revenue (2023: 8.6%) globally.[24] Not all of the expenses are marketing costs. In the protein transition, the marketing expenses for animal-based protein products will decline, while the expenses for plant-based alternatives will move up.

As a methodology, Table 12 calculates the additional information/marketing expenditure for the whole supply chain, and the additional share that a company such as CPF has to contribute for a protein transition. As the outcome of the analysis is about the change in marketing spending, it is less crucial whether the starting point of the analysis is exactly right:

- A category that needs to remain stable requires 5-10% marketing spend per revenue value. The Base scenario is set at 7.5%. As meat sales are expected to decline, a reduction to 5.3% is assumed for the 30% scenario, 3.8% for the 50% scenario, and 0% for the 100% transition scenario.
- A category that needs to grow requires 11-20% marketing spending as a percentage of aspirational revenues. The assumption is 15.5% in the first important phase of 30% penetration for alternatives. In the phases of 50% and 100%, economies of scale in marketing may occur. Therefore, the assumption is 14% respectively 10% in those scenarios.
- Thus, in the 30% scenario, the total annual marketing expenditure for the protein category would increase by € 100 million for CPF and partners (food retail, food service) in the supply chain. In the 100% transition, CPF and partners would need to pay € 304 million extra.
- The assumption is that the marketing costs are always shared in the chain with the food retailers and food service companies. The assumption is that a company such as CPF takes up at least 70%.
- This means that CPF would have to pay € 75 million extra per year in the 30% scenario and up to € 228 million extra in a 100% transition scenario.

Table 12 CPF: change in marketing costs due to protein transition (2050)*

€ million	**Base scenario**	**30% scenario**	**50% scenario**	**100% scenario**
Basis data				
Tons of full product	0	870,392	1,450,654	2,901,307
Farm + food products value	12,171	12,171	12,171	12,171
Animal-based protein products	12,171	8,520	6,086	0
Plant-based protein products	0	3,651	6,086	12,171
% plant-based protein products	0%	30%	50%	100%
Marketing costs				
% on revenues for animal-based products	7.5%	5.3%	3.8%	0.0%
% on revenues for plant-based protein products	15.5%	15.5%	14.0%	10.0%
Marketing costs for animal-based protein products	913	447	228	0
Marketing costs for plant-based protein products	0	566	852	1,217
Total marketing costs	913	1,013	1,080	1,217
Change in marketing costs		100	167	304
Share for the producer (75%)		**75**	**126**	**228**

Source: Profundo estimates, based on CPF Annual Results and other data and analysis; of CPF current revenues, it is assumed that 80% is consumer facing; more than 20% is animal feed and that is business-to-business; *) Pro forma outcomes of the transition scenarios in 2050 assuming no other changes in CPF.

4.4.2 The cost of building new capacity on the supply side

Due to the transition to higher capacity in plant-based protein products, CPF must expand its infrastructure in this area. This will mainly involve constructing new processing factories or modifying the setup of existing factories. The financial consequences would include:

- The investments in new capacity or processing machines.
- The accelerated depreciation of existing capacity.

The expenses on a plant-based meat factory include:

- Equipment: specialised food processing machinery, such as extruders, mixers, and packaging lines. This is often the largest single cost component.
- Building and Utilities: The cost of the physical building itself, including infrastructure for power, water, and waste management.
- Indirect Costs: Expenses like planning, engineering, project management, and legal fees.
- Raw Materials: The initial inventory of ingredients like pea protein, soy, wheat, coconut oil, and flavourings.
- Licenses and Permits: Regulatory compliance costs.[25]

The cost to set up a plant-based meat factory, when measured per ton of annual production capacity, can vary significantly depending on whether you are building a new facility from scratch or retrofitting an existing one, and the product that needs to be produced:

- A greenfield/new facility: The capital expenditure or investments for a new plant-based meat factory can range from € 765 to € 2,465 per ton of annual capacity.
- Converting a suitable existing facility to produce plant-based meat is a more cost-effective option. The capital expenditure for this pathway can range from € 85 to € 510 per ton of capacity. This pathway can also be completed in a shorter timeframe than new construction.[26]
- The Good Food Institute also calculates a large-scale plan: 810 factories, each with 30,000 tons of capacity, require € 23 billion in total investments, which is € 944 per ton capacity.[27]

Another example of a large-scale facility, the joint venture between Plant & Bean and Nutra Regenerative Protein Co. (NRPT) established a plant-based meat facility in Ayutthaya with a production capacity of 25,000 tons. The investment was split 51% by NRPT and 49% by Plant & Bean.[28] The factory would manufacture plant-based protein products for Southeast Asia, Australia and New Zealand. It was said to be Thailand's first and largest 100% plant-based food factory.[29] The phase to expand the initial 3,000 tons of capacity to 13,000 tons in 2025-2026 could cost € 0.92 million. The production costs are € 2.30 to € 2.55 per kg, close to the pork price paid in Bangkok.[30] This data shows a low-high range of capital expenditure per ton between € 314 and € 1,306.

Table 13 Capital expenditure per ton of capacity in plant-based protein product processing

	Capex/ton Low (€)	Capex/ton High (€)
GFI: Greenfield	765	2,465
GFI: Conversion	85	510
GFI: Global		944
Plant & Bean/NRPT	92	
Average	314	1,306

Source: Profundo estimate based on The Good Foods Institute (GFI) and other data

In the setup, such as in Thailand, there will be a combination of greenfield developments, changes to existing factories, and, subsequently, expansion of the greenfield sites and the existing factories. An average of the low and high end of the cost range per ton is applied. This leads to an average cost per ton capacity of € 810.

This is multiplied by the tons of the whole product, which contains 12.7% proteins. In other words, the tons of proteins need to be multiplied by eight times.

The annual costs of the capacity consist of interest costs and depreciation costs. For interest costs, a 5% interest rate is applied. For the annual depreciation rate, CPF's average depreciation of property, plant and equipment is divided by the relevant fixed assets (2024 annual report with financial statements; approximately 9.8%), multiplied by the new assets.

The existing animal-based protein product capacity will be written down in 25 years. Companies that adjust their business often take one-off charges. The depreciation costs of these 'old' assets will no longer be reflected in the future Profit & Loss Accounts. This means € 237 million lower charges in a 30% scenario in 2050, and up to € 788 million lower annual depreciation costs for the 100% transition scenario.

Combining all the annual cost lines of new capacity, a 30% plant-based protein scenario will lead to € 132 million lower annual capacity costs, and a 100% scenario will have € 440 million lower annual expenses. **The explanation for the significantly lower expenses during the protein transition is that plant-based proteins do not require the infrastructure of feed mills, livestock farms, and slaughterhouses.**

Table 14 CPF: Annual additional capacity costs in the three scenarios

€ million	**Factor**	**Base scenario**	**30% scenario**	**50% scenario**	**100% scenario**
Costs (€) per ton - Low	A	314	314	314	314
Costs (€) per ton - High	B	1,306	1,306	1,306	1,306
Average	C = (A+B)/2	810	810	810	810
Tons of equivalent plant-based protein	D	0	123,360	205,600	411,199
Tons of full product	E = D/12.7%	0	870,392	1,450,654	2,901,307
Necessary CapEx (€ million)	F = C x E	0	705	1,175	2,351
Interest rate	G	5%	5%	5%	5%
Interest costs (€ million)	H = F x G	0	35	59	118
Depreciation costs new capacity (€ million)	I = F x 9.8%	0	69	115	230
Maintenance investment animal-based facilities	J = 0.88 x transition% x Depreciation 2024	0	-237	-394	-788
Total annual additional costs	**K = H + I +J**	**0**	**-132**	**-220**	**-440**

Source: Profundo estimates.

In the protein transition, a significant amount of assets will not be used anymore, and property, plant, and equipment (PPE) can be sold, and biological assets (livestock) are not needed anymore. Still, these assets have a market value.

The value of biological assets assigned to the meat and dairy industry will not be discounted when reduced during the protein transition process. This is because the breeding of animals can be reduced gradually in the transition process to 2050.

The property, plant and equipment assets that are abundant can be sold in the market. However, a discount might be needed. In this analysis, a 50% discount is applied.

In total, the protein transition scenarios could free up capital from meat and dairy activities of between € 1,511 million (30% scenario) and € 5,036 million (100% scenario).

Table 15 CPF: Freeing up capital from meat and dairy activities

€ million	Base scenario	30% scenario	50% scenario	100% scenario
Value on the balance sheet				
Property, plant and equipment (PPE) + biological assets	8,627	2,588	4,314	8,627
Correction for livestock as % of total (livestock + aquaculture)	88%	88%	88%	88%
Value livestock assets	7,592	2,278	3,796	7,592
Of which:				
Biological assets	1,240	372	620	1,240
PPE	6,423			
Value in the transition process and accelerated sale				
Biological assets		372	620	1,240
PPE balance sheet value		2,278	3,796	7,592
Correction for 'accelerated sale process' or alternative application		50%	50%	50%
Adjusted value of PPE		1,139	1,898	3,796
Freeing up capital from old activities through protein transition		1,511	2,518	5,036

Source: Profundo estimates, based on CPF's financial statements. These calculations do not include all associates, and including them would elevate the numbers.

4.4.3 The costs to support farmers in switching their business model

The route from the low single-digit (in fact, unknown) contribution of plant-based proteins in CPF's revenues to 30%, 50%, and 100% would mean that CPF will face a material shift in its portfolio from meat to alternatives, and experience changes at various stages of its global supply chain. Consider that CPF is largely vertically integrated in feed, farming and processing, but it also has a contract

farming system.[31] Overall, the changes would affect suppliers outside CPF. The impacts could be as follows:

- Suppliers to the feed business, such as grain and soybean farmers, will be affected and might need to change or reduce their activities as fewer raw materials are needed.
- The contract farmers in livestock need to change their business model and become a plant-based protein supplier, cultivating soy and peas instead of livestock.

Suppliers to the feed business already know how to cultivate crops. The main problem is the loss of volume, as plant-based proteins require significantly less crop volume to produce the same amount of protein. A switch in crop knowledge to, for instance, peas, is also required. The transition of a livestock farm to a plant-based farm may involve costs such as purchasing new equipment and buildings, as well as training and education. This may also require financial support to facilitate a smooth and quick transition.

Specific data on the various factors is not available. One example says that the profit per acre for pea farming is US$ 14.03 higher than that for herd farming.[32] Another example for Denmark is that calculations have been made on the cost of protein transition scenarios in the sector:

"[…] the estimates in this study suggest that they will be low compared to the costs of other suggested approaches. At 100% implementation of the PHD (Planetary Health Diet), the deficit relative to the sector's current contribution margin is between € 158.5 and € 217.0 million, depending on assumptions for soy replacement. This does not include expenses related directly to the transition, such as replacement of machinery, but also does not include savings resulting from the replacement of imported soy."[33]

The conclusion is that there is a lack of reports and data providing clear guidance on the costs or necessary investments associated with transitioning from livestock farming to plant-based farming.

A proxy for the operational costs involved in the process of keeping and raising livestock, as well as the loss of income for crop farmers, is needed, which is the reduction of the amount of land used. This can indicate the necessary financial support to farmers. This analysis applies the yields per hectare, global soybean and global corn prices, and an operating margin of 4%[34]. The most important materials for animal feed for chicken and pigs/pork are corn and soy, with corn around 50% for chicken feed, and 60% for pork feed. Soybean meal is 20-25% of the products. The analysis uses an average of 55% corn and 25% soybean meal. The remaining 20% of animal feed consists of vitamins, minerals, additives, and other products, which are sometimes imported and therefore do not require financial support by the CPF for a transition.[35]

In the 100% transition scenario, the reduction in land use for CPF's global activities is 1.56 million hectares. This would mean a loss in proceeds of € 873 million for crop farmers. Applying a 4% margin, the annual loss in earnings would be € 35 million for crop suppliers to CPF and its contract farmers. On top of this, the contract livestock farmers for CPF earn a profit. However, there is a lack of data to extend the calculation.

Of course, not all crop farmers require support, such as large soy farms in Brazil. Additionally, farmers can explore alternative crops for cultivation, such as sugarcane, or opt for reforestation projects. Also, the support may be only temporary, for example, during the first phases of transition. Therefore, the assumption is that only 25% of CPF's global suppliers might need support.

Table 16 CPF: Annual support to farmers during the transition phase

	Base scenario	30% scenario	50% scenario	100% scenario
Yields (tons per hectare)				
Soy	1.6			
Corn	4.4			
Price (global, in €, end of June 2025)				
Soy per ton	361			
Corn per ton	170			
Reduction in land use (km2)	0	4,689	7,816	15,631
Reduction in land use (million ha)	0.00	0.47	0.78	1.56
Loss in proceeds (€ million)	0.0	261.9	436.5	873.0
Operating margin farmers (4%)	0.0	10.5	17.5	34.9
Annual potential transition support for local crop farmers (25%)	**0.0**	**2.6**	**4.4**	**8.7**

Source: Profundo estimates based on Indexmundi (prices), USDA (yields).

4.4.4 Additional measures for climate emission reduction in the animal business

In addition to the crucial transition from animal-based proteins to plant-based proteins, the remaining meat activities can also significantly improve their emission footprint. In the three scenarios for plant-based protein products, the three companies still generate substantial revenues from animal-based protein products. Some meat companies claim that reducing animal-protein activities is "a good alternative to, or substitute for a protein transition."[36]

To keep the analysis transparent, the additional measures to reduce CO_2e emissions are only applied to the supply chain in CPF's meat activities. In that way, the argument of 'low-emission meat production' can be weighted.

A starting point for how to spend money to accelerate CO_2e emission reduction in animal-based protein products is based on a McKinsey study listing 28 measures to reduce emissions and the costs and cost savings per ton of CO_2e.[37] For animal protein production, the study selects four measures that have an above-average contribution to reducing CO_2e emissions, and for crops, five measures. Crops are eaten by animals.

The weighted average of the most important measures for reducing CO_2e in animal protein is a low US$ 5.8 per ton CO_2e, as the expensive measures get a low weight: the first two measures are focused on ruminants, and these create only 8% of CPF's emissions (through dairy activities). In crops, the weighted average is US$ 87.4 per ton CO_2e reduction. The average of the two costs, US$ 45.7 (€ 38.8) per ton, is assumed to be the cost of reducing one ton of CO_2e on-farm.

According to McKinsey, a more efficient farm system can only lead to a limited reduction of GHGs. Globally, sustainable food production, including expansion and adoption of practices and technologies that can reduce emissions while meeting food (and feed) requirements, can generate 2.3 billion tons of emissions, for a total of 14.4 billion tons of climate emissions from agriculture.[38] That is 16.0%. McKinsey's abatement database is based on 10 sectors across 21 world regions

and has a 2030 perspective.[39] For methodological reasons (as indicated above), this report applies the McKinsey analysis to the animal-based protein chain emissions only.

Table 17 Marginal prevention costs for on-farm emissions

	Global emissions (mln ton CO_2e)	Costs per ton CO_2e (US$)	Weight
Animal protein			
Utilise advanced feed additives for livestock	350	99	4%*
Apply nitrogen inhibitors and urease inhibitors on the pasture	214	35	4%*
Improve animal health monitoring and illness prevention	112	0	46%
Employ GHG-focused breeding and genetic selection in livestock*	81	0	46%
A. Weighted average		***5.8***	***100%***
Total global emissions of the four measures in animal protein	757		
Crops			
Reduce the overapplication of fertiliser on fields	131	-146	18%
Apply nitrogen inhibitors and urease inhibitors on crop fields	126	-37	17%
Employ low- or no-till practices on crops	91	123	13%
a- extra due to sequestration on the farm	218	0	30%
Convert from flood to drip/sprinkler irrigation	85	116	12%
Convert to the use of enhanced-efficiency fertilisers	73	904	10%
B. Weighted average		***87.4***	***100%***
Total global emissions of the five measures in crop cultivation	724		
Weighted average of the nine measures (A + B)		***45.7***	
Weighted average of the nine measures (A + B) in Euro		***38.8***	

Source: Profundo based on McKinsey; *) the selection of measures is based on McKinsey analysis and could contain GMO-linked actions; *) In this analysis, these get a lower weight as these two measures apply to ruminants, which are relatively small in CPF's business: dairy creates 8% of CPF's total emissions.

By multiplying the meat emissions by 16% (the share that additional measures can reduce), the potential on-farm emissions can be calculated (see Table 18, and also section 3.3): these amount to 3.5 million tons of emissions in the Base scenario, for instance. If this outcome is multiplied by the prevention costs per ton CO_2e emission, the total prevention costs would be, for instance, € 68 million in a 50% scenario. Assuming that a minority (25%) of the meat production is executed by contract farmers, who should pay for their own costs, CPF will have to pay 75% or € 51 million in a 50% protein scenario.

Table 18 CPF: Additional measures for CO_2e reduction in animal-based protein revenues

	Base scenario	30% scenario	50% scenario	100% scenario
Emissions				
Remaining animal meat emissions (million ton CO2e)/on-farm emissions	21.7	15.2	10.0	0.0
Part that can be reduced through extra measures (million ton CO2e)	3.5	2.4	1.7	0.0
Costs				
Prevention costs per ton CO2e reduction (€)	38.8	38.8	38.8	38.8
Total prevention costs (€ million)	135.0	94.5	67.5	0.0
Share for CPF (75%)	101.3	70.9	50.6	0.0

Source: Profundo estimates, based on Table 5 and Table 18

4.4.5 Summary of additional costs

The total annual protein transition and prevention costs would be € 101 million in the Base scenario (on-farm measure costs) and € 17 million in a 30% scenario. However, in the 50% and 100% scenarios the costs for the new plant-based capacity is dwarfed by the declining cost of the old, much broader, infrastructure. Consequently, these transition costs are negative.

Table 19 CPF: Summary of transition and prevention costs in three scenarios

€ million	Base scenario	30% scenario	50% scenario	100% scenario
Transition costs				
New capacity costs	0	-132.1	-220.2	-440.5
Annual potential transition support for local crop farmers (25%)	0	2.6	4.4	8.7
Additional marketing costs	0	75.3	125.5	228.2
Prevention costs				
Additional on-farm (crops + livestock) measures	101.3	70.9	50.6	0.0
Total transition and prevention costs	**101.3**	**16.7**	**-39.7**	**-203.5**

Source: Profundo estimates based on preceding tables

4.5 The benefits of a protein transition

4.5.1 Methodological choices on operating benefits

This report calculates the benefits based on the assumption that consumers pay the same price for plant-based proteins as for animal-based proteins. Currently, both the economies of scale and the price positioning are completely different between meat production and plant-based protein products. Meat production is a large industry, and the supply and processing chain has become very efficient, leading to relatively low meat prices in a competitive retail environment.

Plant-based alternatives' economies of scale are still relatively small and need to increase, and food retailers often still position the category as a niche market with a high price and margin because of the low turnover rate on the supermarket shelf. In this, the category will not be handled much differently from the biological or organic categories. A study showed that this category in one supermarket is 56% more expensive than conventional products, but based on supply chain costs, this difference should be 16%.[40]

Currently, plant-based meat has an average 35% price premium over meat in a selection of Southeast Asian markets. However, sausages are 69% more expensive, meatballs 91% and burgers 59%.[41] Other data (2023) show that in Thailand, price premiums of plant-based meat alternatives are between 9% and 54%.[42] The higher prices could suggest that the margins on plant-based alternatives are higher than on animal-based proteins. As stated in the paragraph above, food retailers might be responsible for the high pricing of plant-based protein products.

The producers of plant-based protein products have a different business model from the producers of animal-based protein products. Per gram of protein produced, fewer crops and land are required, but probably more advanced factories and processing equipment are needed. Moreover, with fewer economies of scale, the plant-based protein producers will need relatively more marketing expenses per gram, and are still in the process of a learning curve.

Another difference in cost items consists of labour costs. In animal-based protein production, the slaughter requires large amounts of labour, with relatively low wages, while in plant-based protein production, less labour will be required (more automation in processing), but costs per employee might be higher because of engineering tasks in factories.

Given that raw materials are a relatively large cost component in food companies and labour is much smaller, the current analysis on operating cost benefits focuses on differences in raw material costs in the production process. Also, the assumption is that the sales price per gram of protein and the price per kilogram of plant-based protein products will move to an equal level as that of animal-based products.

4.5.2 The raw material cost benefit of the protein transition

While plant-based and alternative proteins require other factories, more automation, and several other additional costs (see section 4.4), the protein transition leads to lower land use because there is less need for agricultural materials in feed. This reduces the need for corn, soybeans, and expensive vitamins, minerals, and other additives.

As stated in the section 4.4.3, animal feed consists of 55% corn, 25% soybean meal, and the rest of other products. Vitamins, minerals, and additives might raise production costs by 10%.[43] This means that these materials produced by companies like Bayer, contribute a material percentage to the animal feed price.

Table 20 starts with the loss in revenues of crop farmers (from Table 16). Added to this are the extra costs for vitamins, minerals, and additives. The protein transition scenarios result in savings of €288 million in a 30% transition and €960 million in a 100% transition in raw material costs.

Table 20 CPF: Summary of transition and prevention costs in three scenarios

€ million	Base scenario	30% scenario	50% scenario	100% scenario
Lower sourcing costs from crop farmers	0.0	261.9	436.5	873.0
Lower costs from chemical additives in their animal feed business	0.0	26.2	43.7	87.3
Total of lower costs of supplies	0.0	288.1	480.2	960.3

Source: Profundo estimates based on Table 16 and data on the costs of vitamins, minerals and additives

4.5.3 Lower interest rates on debts

CPF might be able to reduce the interest rates on their debt. Financial institutions, which try to green their loan portfolios, could charge lower interest rates on debt of companies that are making their businesses more sustainable. Lenders could offer discounted rates for eco-projects, sometimes 0.5% to 2% lower than standard loans.[44] Sustainability-linked loans (SLLs) have a discount of less than 1%-point[45], while green farming in the UK could give 0.3%-point lower interest rates.[46]

With the example of CPF, the company has € 14.1 billion in net debt in a Base scenario, and would have € 13.3 billion, € 12.7 billion and € 11.4 billion in the 30%, 50% and 100% protein transition scenarios. In 2024, the cost of debt for CPF was 4.30% (2023: 4.34%)[47]. A reduction of 0.125% in a 30% transition, 0.25% in a 50% transition, and 50% in a 100% transition scenario would reduce annual interest costs by € 14.6 million, € 28 million and € 50.1 million, respectively. The interest rate discounts are applied to the livestock business only (88% of the total).

Table 21 CPF: Lower financing cost opportunity

€ million	Base scenario	30% scenario	50% scenario	100% scenario
Additional investments for protein transition (average)		705	1,175	2,351
Freeing up of capital from old activities through the protein transition (presented as a negative number)		-1,511	-2,518	-5,036
Net debt	**14,070**	**13,264**	**12,727**	**11,384**
% interest rate advantage for ESG improvement		0.125%	0.25%	0.50%
Share for the global livestock and alternative protein business	88.0%	88.0%	88.0%	88.0%
Lower interest costs	**0.0**	**14.6**	**28.0**	**50.1**

Source: Profundo estimates based on preceding tables

4.5.4 The reputation and ESG benefits of the protein transition and emission reduction

The valuation of the companies could be an additional argument for a protein transition. A more sustainable profile would be positive for the reputation, and this could raise a company's valuation on the stock market, which would benefit owners/shareholders.

Companies that reduce their emissions and land use can benefit from an improvement in their reputation, as their sustainable profile would improve. The consequence might be better Environmental, Social and Governance (ESG) ratings at the various rating agencies.

While negative reputation events can harm a company's value by 30%, positive reputation events might give value a positive impact of 20%. In the long term, a positive reputation improves earnings. This positive impact can stem from better client and supply chain relationships, quality personnel, and ultimately enhanced earnings capacity. Companies with stronger reputations tend to see lower costs of capital. The latter will impact the value of the shares. This implies that a company systematically working on improving its reputation (a 100% protein transition) would face a positive value impact of 20%. If a company systematically damages its own reputation, it would face a 30% value deterioration.[48]

This reputation impact will be accounted for in the section on valuation (see section 4.6.3 and Table 24).

4.5.5 The 'opportunity profit' of carbon sequestration from reforestation

Another benefit from the protein transition is the opportunity for idle agricultural land to sequester CO_2 through reforestation and become a carbon sink.

These benefits are not included in CPF's total benefits. This is because carbon sequestration is a societal profit reaped by the world rather than individual companies like CPF.

However, it is interesting to add this calculation in an update of this report.

4.6 Conclusion on costs and benefits for CPF and the other three companies

Table 19 summarises the total transition costs and prevention costs for CPF from the protein transition scenarios. Table 22 adds the benefits to this.

The table shows that the Base scenario has the worst outcome in cost and benefits, with total annual costs of € 101 million. The protein transition scenarios show low or negative costs and large benefits. These net benefits of a protein transition range from € 286 million to € 1,214 million, pre-tax.

Table 22 CPF: Annual costs and benefits in protein transition scenarios

€ million	Factor	Base scenario	30% scenario	50% scenario	100% scenario
Costs					
Total transition and prevention costs	A	101.3	16.7	-39.7	-203.5
Benefits					
Lower costs of supplies	B	0.0	288.1	480.2	960.3
Lower debt costs through ESG enhancement	C	0.0	14.6	28.0	50.1
Balance of benefits and costs of transition	B + C - A	-101.3	286.0	547.9	1,214.0

Source: Profundo estimates based on preceding tables.

These cost savings through the protein transition scenarios impact important parameters for financiers. **The most important ratios are A. Net debt to EBITDA and B. net profit or earnings per share.**

4.6.1 Net debt to EBITDA ratio

The Net debt/EBITDA measures the size of the gross debt minus the cash position on the balance sheet, and compares this with the annual gross cash flow number EBITDA (Earnings Before Interest, Tax, Depreciation, and Amortisation). This ratio indicates the number of years it might take to repay the debt from the gross cash flow. A ratio of 2x to 3x is often comfortable for financial markets.

In 2024, CPF had a Net debt/EBITDA ratio of 7.8x (see Table 11). In the Base scenario, which includes the costs of on-farm emission reduction measures, the ratio deteriorates to 8.3 times (Table 23).

The protein transition scenarios would lead to a lower Net debt and a higher EBITDA. As a result, the Net debt/EBITDA ratios would improve in the three transition scenarios, to even 3.7x in the 100% scenario, which is a positive signal for financial strength.

4.6.2 Net profit

The net profit impact would be +44% in the 30% scenario, +85% in the 50% scenario, and +188% in the 100% protein scenario (Table 23). These benefits are fully reaped when the transition scenarios are completed in 2050. In the annual steps that CPF is taking to shift its course to one of the protein transition scenarios by 2050, the benefits are accumulating to these total annualised numbers for 2050. This means that the annual net profit impacts are smaller: 1.5% in the 2030 scenario, 2.5% in the 50% scenario, and 4.3% in the 100% scenario.

These annual positive impacts through transition can be confronted with the 0.7% annual negative impact in the Base scenario. This means that in a Base scenario, every year, until 2050, CPF will be confronted with a 0.7% pressure on net profit, as for instance government climate regulation requires taking more on-farm measures to reduce emissions in the livestock chain; these additional costs would accumulate to a € 101 million pressure on EBITDA in 2050, and € 76 million in net profit in 2050.

Table 23 CPF: Impact of protein transition on P&L and Balance Sheet

€ million	Factor	Base scenario	30% scenario	50% scenario	100% scenario
EBITDA 2024	A	1,803			
Total net-benefits (pre-tax profit impact)	B	-101	288	548	1,214
of which:					
Higher interest costs from building new capacity	*C*	*0*	*-35*	*-59*	*-118*
Lower interest costs from ESG/sustainability rating	*D*	*0*	*15*	*28*	*50*
EBITDA impact	E = B - D - C	-101	307	579	1,281
EBITDA	F = A + E	1,702	2,110	2,382	3,084
Net debt change from new capacity	G	0	-806	-1,343	-2,686
Net debt	H	14,070	13,264	12,727	11,384
Net debt/EBITDA (X)	I = H/F	8.3	6.3	5.3	3.7
Net profit 2024	J	484			
Net profit impact (annual, 25% tax rate)	K = 0.75 x B	-76	215	411	910
Net profit pro forma	L = J + K	408	699	895	1,394
% impact when transition is completed	M = L/J -1	-15.7%	44.3%	84.9%	188.1%
% annual impact per year in 2025-2050	N = (1+M)^(1/25)-1	-0.7%	1.5%	2.5%	4.3%

Source: Profundo estimates.

4.6.3 Valuation

The higher net profit and the lower net debt in the transition scenarios could have a material impact on the value of CPF on the stock market. Important valuation ratios are 1) the ratio Enterprise Value (EV) to EBITDA, and 2) the Price/Earnings ratio.

If in the transition scenarios these ratios would remain in line with the current EV/EBITDA ratios for CPF in the Base scenario, a 30% protein transition could enhance the market value by 119%. In a 50% and 100% transition, this would be 198% and 402%, respectively.

By applying this valuation methodology to the Price/Earnings ratio, the difference would be lower. The respective value enhancements in the protein transition scenarios could be 71%, 119% and 242%.

The differences between the Base scenario and the protein transition scenarios would become even larger when the reputation value theory is added. Then, after averaging the implicit EV/EBITDA and Price/Earnings effects and adding the reputation impact, the protein transition scenarios could enhance the total market capitalisation by 101% to 342%, while the Base scenario would face a 30% value reduction.

Table 24 CPF: Valuation impact

€ million	Factor	Base scenario	30% scenario	50% scenario	100% scenario
EV/EBITDA calculation					
Market capitalisation	A	4,408			
Net debt	B	14,070	13,264	12,727	11,384
Enterprise value	C = A + B	18,478			
EBITDA	D	1,702	2,110	2,382	3,084
EV/EBITDA (X)	E = C/D	10.9			
Implicit enterprise value	F = E x D	18,478	22,908	25,861	33,492
Implicit market capitalisation	G = F - B	4,408	9,644	13,134	22,108
% change versus Base scenario	H = G/A - 1		118.8%	197.9%	401.5%
P/E calculation					
Market capitalisation	I	4,408			
Net profit	J	408	699	895	1,394
Price/earnings ratio (X)	K = I/J	10.8			
Implicit market capitalisation	L = J x K	4,408	7,546	9,668	15,065
% change versus Base scenario	M = L/I -1		71.2%	119.3%	241.7%
Potential valuation change					
Average change in valuation (%) based on existing valuation multiples	N = (H + M)/2	0.0%	95.0%	158.6%	321.6%
Reputation impact	O	-30.0%	6.0%	10.0%	20.0%
Total valuation change (%)	P = N + O	-30.0%	101.0%	168.6%	341.6%

Source: Profundo estimates.

4.7 Omissions and future additions

A benefit that could be added to the transition scenarios is the reduction of land use and the potential to use these areas for reforestation. This would lead to sequestration of CO_2e. However, companies cannot integrate this benefit into their financial accounting, as reforestation is a societal benefit.

Also, the societal benefits from the CO_2e reductions by the transition scenarios have not been accounted for.

The model in this report has also not calculated the impact of a combination of lower sourcing costs and, later, lower marketing and information costs at the moment that plant-based protein products have been accepted by the majority of consumers and all companies have adjusted to plant-based capacity. The much smaller infrastructure costs from plant-based proteins (no feed

mills, no farms, no slaughterhouses) leads to much lower costs per unit of protein, in the long-term and in perfect market conditions).

References

1 CP Group (n.d.), "About CP – Our business", online: https://www.cpgroupglobal.com/en/about-cp/our-business, viewed in August 2025.

2 CPF (n.d.), "About", online: https://www.cpfworldwide.com/th/about, viewed in August 2025.

3 CPF (2025, February), *Results Briefing FY2024*, p.21, and FactSet.

4 CPF (2025, February), *Results Briefing FY2024*, p.13, 20.

5 CP Group (n.d.), *Sustainability Report 2024,* p.159.

6 Meat Zero Brand (n.d.), online: https://www.meatzerobrand.com/en/, viewed in August 2025.

7 GFI (2023, September), "6 companies walking the alt protein path to 2030", online: https://gfi.org/blog/six-companies-walking-the-alt-protein-path-to-2030/.

8 Science Based Targets, "What are Science-Based Target?", online: https://sciencebasedtargets.org/how-it-works, viewed September 2025.

9 CPF (2025), *CPF's Sustainability Journey Passion towards Net-Zero,* p.15.

10 IPCC (2021, August), "Sixth assessment report", online: https://www.ipcc.ch/assessment-report/ar6/, viewed in September 2023.

11 Lie-Piang, A., N. Braconi, R. M. Boom and A. van der Padt (2021, April 10), "Less refined ingredients have lower environmental impact – A life cycle assessment of protein-rich ingredients from oil- and starch-bearing crops", Journal of Cleaner Production, Vol. 292: 126046.

Sinke, P., E. Swartz, H. Sanctorum, C. van der Giesen and I. Odegard (2023), "Ex-ante life cycle assessment of commercial-scale cultivated meat production in 2030", The International Journal of Life Cycle Assessment, 28, 234- 254.

12 Source: discussions of NGOs with companies.

13 McKinsey & Company (2023, June), The Agricultural Transition: Building A Sustainable Future, p. 13.

14 McKinsey & Company (2009), Pathways to a Low-Carbon Economy, p. 3.

15 Rijk, G. and B. Kuepper (2025, March), *Profit or Planet? Ahold Delhaize's profits can fund a transition towards sustainable, Paris-aligned food*, Amsterdam, The Netherlands: Profundo.

16 Veconomist (2020, October 27), "Let's Plant Meat: "Can Thailand Make a Dent in the Plant-Based Meat Universe?"", online: https://vegconomist.com/interviews/lets-plant-meat-can-thailand-make-a-dent-in-the-plant-based-meat-universe/, viewed August 2025.

17 The Good Food Institute (2020), *Asian cropportunities,* The Good Food Institute Asia Pacific (GFI APAC).

18 Green Queen (2024, January 11), "67% of Thai Consumers Want to Eat Less Meat and More Plant Proteins For Health", online: https://www.greenqueen.com.hk/thailand-meat-consumption-vegan-survey/, viewed August 2025.

19 Food Frontier (2023, July), *Alternative Proteins and Asia. Insights for Australian and New Zealand exporters on China, Singapore, South Korea, Japan and Thailand*. Food Frontier Institute Ltd, Melbourne, Australia.

20 Good Food Institute APAC, *Alternative proteins in APAC. 2023 State of the Industry Report.* Food Frontier Institute Ltd, Melbourne, Australia.

21 Food Frontier (2023, July), *Alternative Proteins and Asia. Insights for Australian and New Zealand exporters on China, Singapore, South Korea, Japan and Thailand.* Food Frontier Institute Ltd, Melbourne, Australia.

22 HawkSEM (2024, October 31), "You should plan to invest between 5% and 20% of your revenue on marketing, depending on whether you want to sustain or grow. Learn why from top digital marketing agency experts", online: https://hawksem.com/blog/what-percentage-of-revenue-should-be-spent-on-marketing/, viewed in February 2025.

23 Forbes (2022, April 13), "How much should you spend on marketing", online: https://www.forbes.com/councils/theyec/2022/04/13/how-much-should-you-spend-on-marketing/, viewed February 2025.

24 CPF (2025, February 27), *FY2024 Results Briefing. Investor Presentation*.

25 FinModelsLab.

26 The Good Food Institute and Vegconomist.

27 The Good Food Institute (2022), *Plant-based meat: Anticipating 2030 production requirements*.

28 Vegconomist (2024,April 22), "Plant & Bean Opens New Plant-Based Meat Facility in Thailand", online: https://vegconomist.com/manufacturing-technology/thailand-plant-based-meat-manufacturing/, viewed August 2025.

29 The Plant Base (2024, April 24), "Plant & Bean opens new Thailand factory", online: https://www.theplantbasemag.com/news/plant-bean-opens-new-thailand-factory/#:~:text=Through%20a%20partnership%20with%20Nutra%20Regenerative%20Protein%20Co,between%20Thailand-based%20food-tech%20companies%20Innobic%20and%20Nove%20Foods., viewed August 2025.

30 Green Queen (2024, April 2024), "Down, Out and Back: Plant & Bean Back On the Map with New Factory in Thailand", online: https://www.greenqueen.com.hk/plant-and-bean-based-meat-factory-thailand-nr-instant-produce/, viewed August 2025.

31 CPF, Annual Review 2024, p.17.

32 Clayton, E.R. (2018, December), "From animal agriculture to the plant-based economy", Good Food Institute, online: https://gfi.org/blog/transitioning-from-animal-agriculture/, viewed in February 2025.

33 Prag, A.A. and Henriksen, C.B. (2020), Transition from Animal-Based to Plant-Based Food Production to Reduce Greenhouse Gas Emissions from Agriculture—The Case of Denmark, Copenhagen, Denmark: Department of Plant and Environmental Science, University of Copenhagen.

34 Pavel Boev, Gerard Rijk, Manon Stravens (2024, April 29), "The environmental impact of food", online: https://wwfeu.awsassets.panda.org/downloads/240429_report-profundo-wwf_final.pdf, viewed August 2025.

35 Several sources.

36 Source: discussions of NGOs with companies.

37 McKinsey & Company (2023, June), The Agricultural Transition: Building A Sustainable Future, p. 24.

38 McKinsey & Company (2023, June), The Agricultural Transition: Building A Sustainable Future, p. 13.

39 McKinsey & Company (2009), Pathways to a Low-Carbon Economy, p. 3.

40 Rijk, G. and B. Kuepper (2025, March), *Profit or Planet? Ahold Delhaize's profits can fund a transition towards sustainable, Paris-aligned food*, Amsterdam, The Netherlands: Profundo.

41 Good Food Institute APAC, *Alternative proteins in APAC. 2023 State of the Industry Report.*

42 Food Frontier (2023, July), *Alternative Proteins and Asia. Insights for Australian and New Zealand exporters on China, Singapore, South Korea, Japan and Thailand*. Food Frontier Institute Ltd, Melbourne, Australia.

43 Based on comparing the value of the animal mineral, vitamin, plus additive market and the value of the compound feed market, such from Feed and additive (2025, February 7), "Global Animal Feed Additives Market", online: https://www.feedandadditive.com/global-feed-additives-market/#:~:text=Recent%20market%20reports%20suggest%20that%20the%20market%20was,continue%20to%20grow%20steadily%20in%20the%20coming%20period., and Fortune Business Insight (2025, September 8), "Animal Nutrition", online: https://www.fortunebusinessinsights.com/industry-reports/compound-feed-market-100525#:~:text=The%20global%20compound%20feed%20market%20size%20was%20USD,with%20a%20market%20share%20of%2041.28%25%20in%202024.

44 Finance Advice Agency (2025, May 24), "Green Loans and Sustainable Financing: Fueling Eco-Friendly Projects", online:https://financeadviceagency.com/green-loans-and-sustainable-financing-fueling-eco-friendly-projects/#:~:text=Many%20lenders%20offer%20discounted%20rates%20for%20eco-projects%E2%80%94sometimes%200.5%25,value%20by%20up%20to%2010%25%E2%80%94according%20to%20some%20studies.

45 Sustainable Finance Explained (2023, November 17), "How to structure sustainability-linked loans: The ultimate guide", online: https://sustainablecapitalgroup.com/blog/how-to-structure-sustainability-linked-loans-the-ultimate-guide/, viewed September 2025.

46 FarmingUK (2025, September 18), “Barclays launches discounted finance scheme for greener farming”, online: https://www.farminguk.com/news/barclays-launches-discounted-finance-scheme-for-greener-farming_67243.html, viewed September 2025.

47 CPF (2025, February 27), “FY2024 Results Briefing”, online: https://www.cpfworldwide.com/storage/public_present/pdf_en_CPF_FY2024_Results_1740629574.pdf, viewed September 2025.

48 Gerard Rijk, Tim Steinweg, Matt Piotrowski (2019, May), “Deforestation-Driven Reputation Risk Could Become Material for FMCGs “, online: https://chainreactionresearch.com/wp-content/uploads/2019/05/Reputation-Risk-and-FMCGs.pdf, viewed September 2025.

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