

Analysis

**How German supermarkets
can meet emissions reduction
targets... and save money**



madre brava



Photo: Nathan Dumiao / Unsplash

Executive Summary

“Rebalancing protein offerings is the quickest and most cost effective way to reduce greenhouse gas emissions from Germany’s food retail sector.”

This first-of-its-kind analysis provides major German food retailers with the clearest picture yet of how to reach climate targets cost-effectively.

It is based on the report [Biggest Bang for the Buck: Cost-Effective Pathways to Climate Targets in German Food Retail](#) by environmental sustainability consultancy Quantis and global environmental advocacy organisation Madre Brava, with additional food sector analysis by Madre Brava.

The analysis provides German food retailers with invaluable insight into the costs and impact of emission reduction strategies. These insights can form the basis for retailers to draw-up ‘climate transition plans’ to comply with the [EU Corporate Sustainability Reporting Directive \(CSRD\)](#). It can also support meeting [Scope 3 FLAG emissions targets under the Science-Based Target initiative \(SBTi\)](#), of which all major German retailers are part.

It looks at three key strategies:

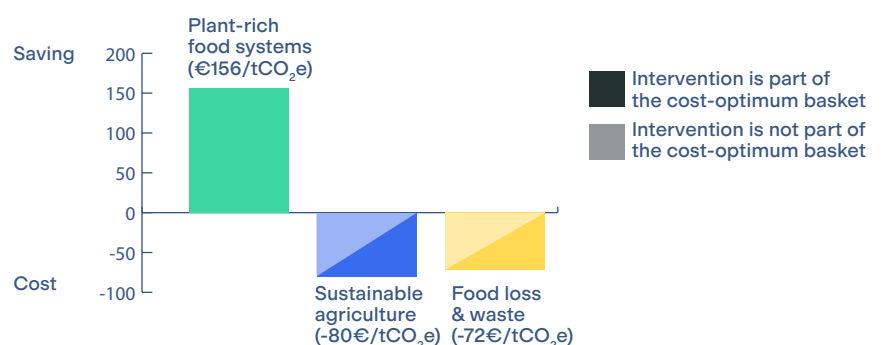
- A shift to plant-rich food systems.
- Improved sustainable agricultural practices.
- Reduced food loss and waste (FLW).

Of the three strategies, one is overwhelmingly advantageous.

Rebalancing protein offerings to support plant-rich diets is the quickest and most cost effective way to reduce greenhouse gas emissions from Germany’s food retail sector.

An ambitious but realistic rebalancing of proteins towards more plants and less meat and milk can save up to 16 MtCO₂e by 2030 at a saving of €156 per tonne of CO₂e reduced. It is the only climate mitigation strategy that saves money, as plant-based alternatives are less resource intensive, using less land, water, and energy, making them cheaper to produce – and can be sourced at a lower cost to retailers.

Financial savings in €/tCO₂e per key climate mitigation strategy



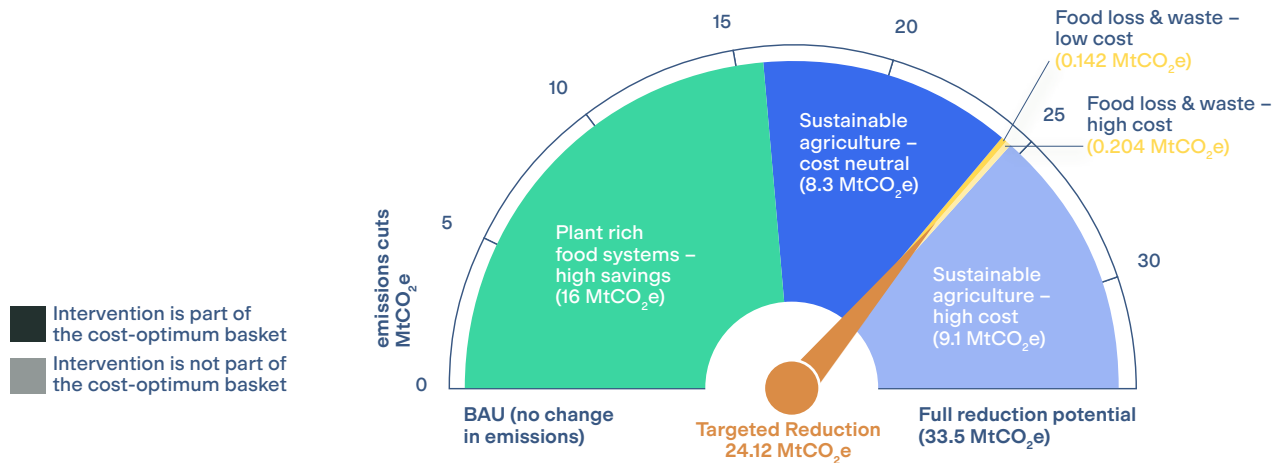
In an environment where meat prices keep going up and the production costs of plant-based alternatives keep going down due to economies of scale, this shift could benefit consumers with a larger variety of cheaper plant-based meat products. Today, [one German retailer](#) sells plant-based products at the same price as conventional meat and milk – and [industrywide the prices are converging year after year](#).

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German food retail must reduce its FLAG emissions by 24.12 MtCO₂e – from currently 91.11 MtCO₂e.”

Using publicly available data, we estimate that the German food retail sector must reduce its Scope 3 Food Land and Agriculture (FLAG) emissions by 24.12 MtCO₂e – from its 2023 levels of 91.11 MtCO₂e.

So while rebalancing protein offerings is the standout climate mitigation strategy, no one strategy or intervention can deliver all of the necessary emissions cuts. We therefore select the mix of interventions that would enable the sector to hit its emissions reduction target in the most cost effective way.

Getting Up To Speed – Prioritisation of Climate Interventions for the German Retail Sector



This cost-optimum basket can bring the German food retail sector up to speed in meeting its climate targets. It consists of the following interventions:

- Ambitious but realistic pathway of a 30% meat and milk substitution with plant-based alternatives
- Heat stress management in livestock production
- Improved animal health and disease treatment
- Crop protection products
- Nitrification and denitrification inhibitors
- Reducing the overapplication of nitrogen fertiliser
- Variable rate fertiliser application
- Electrification of farm machinery in crop production
- Consumer education programme to reduce meat and dairy food waste

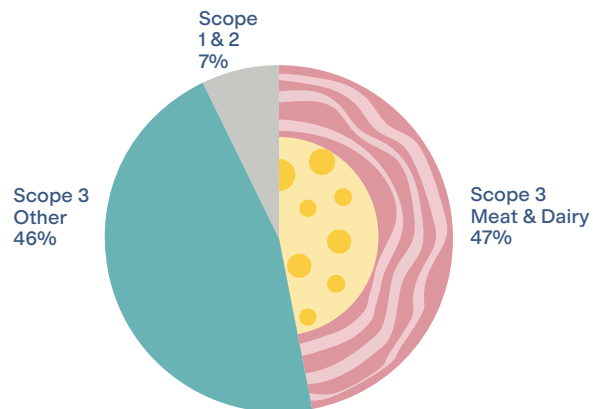
The analysis by Madre Brava based on the Quantis report concludes that this cost-optimal basket of climate mitigation measures reduces emissions by 24.4 MtCO₂e in retailers’ supply chain, slightly overdelivering on the target of 24.12 MtCO₂e by 2030, whilst simultaneously leading to financial savings of around €2.5 billion.

Context



One third of all global emissions are produced by our food system, making it second only to energy. And more than 90% of food retailers' emissions come from their supply chains, their so-called Scope 3 emissions, with around half of that coming from meat and dairy.

Meat and dairy alone make up almost half of all emissions of a food retailer

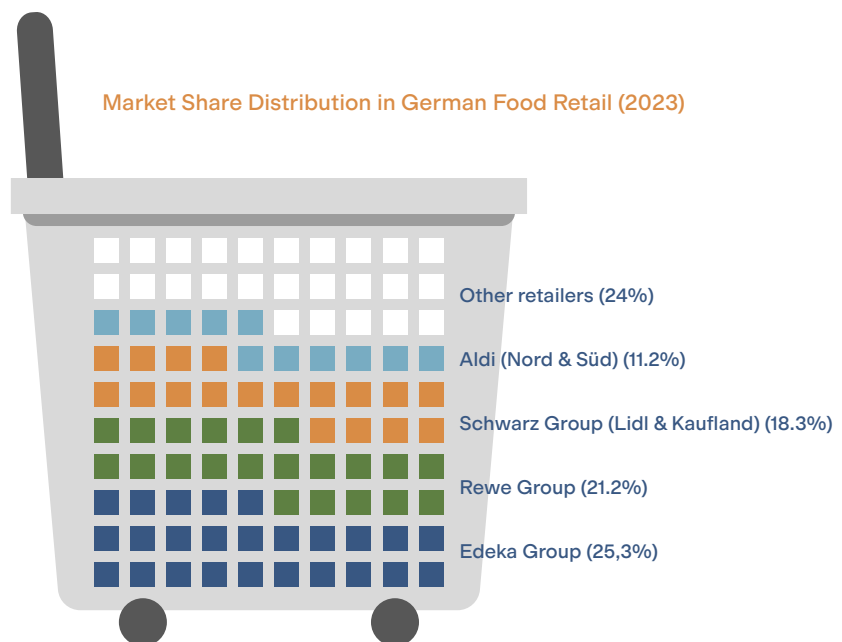


Grocery retail GHG emission breakdown (% of CO₂e)

Source: https://www.eurocommerce.eu/app/uploads/2023/05/State-of-grocery-2023_Low-res.pdf

In Germany, three-quarters of the food retail market is controlled by just four companies: the 'Big 4' - Edeka, Rewe, Lidl and Aldi.

Market Share Distribution in German Food Retail (2023)



Source: <https://www.statista.com/statistics/505129/leading-companies-in-food-retail-germany/>

What these retail giants sell, how they ask their suppliers to produce it, and how they approach waste, massively affects the sector's emissions.

Supermarket giants must increasingly meet climate requirements of European regulations and international standards, such as the EU's Corporate Sustainability Reporting Directive (CSRD) or voluntary private sector initiatives like the Science Based Target initiative (SBTi).

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Strong and realistic climate transition plans are key to avoid investor scrutiny.”

The CSRD however makes annual sustainability reporting no longer optional but mandatory. Those reports must be clear on climate impacts, risks, and decarbonization plans. Strong, plausible and realistic climate transition plans are key to meeting these requirements and to avoid investor scrutiny.

As all four major German retailers, Aldi, Edeka, Lidl and Rewe are part of the SBTi, the voluntary industry initiative, they are off to a headstart. In order to have their net-zero targets verified by SBTi, companies with more than 20% of their total emissions across Scopes 1, 2, and 3 coming from FLAG, are also required to set FLAG targets. Most food retailers have been through this process already, which should enable them to define realistic climate plans easier.

Alongside those regulations, retailers are eager to chart a course to lower emissions to make their supply chains and hence their business model climate resilient. A robust climate plan is key to achieve those targets. German food retailers Scope 3 emissions targets for 2030 act as a stepping stone to reach net zero by 2050 latest, while the German [government's own climate stability goal](#) aims for the country to reach net zero by 2045.

Besides the collective gains of a healthy planet and climate, which is essential for their companies to prosper, food retailers also stand to make individual gains from increasing their climate resilience, as having more robust Environmental, Social and Governance goals can make them more [attractive to investors](#).

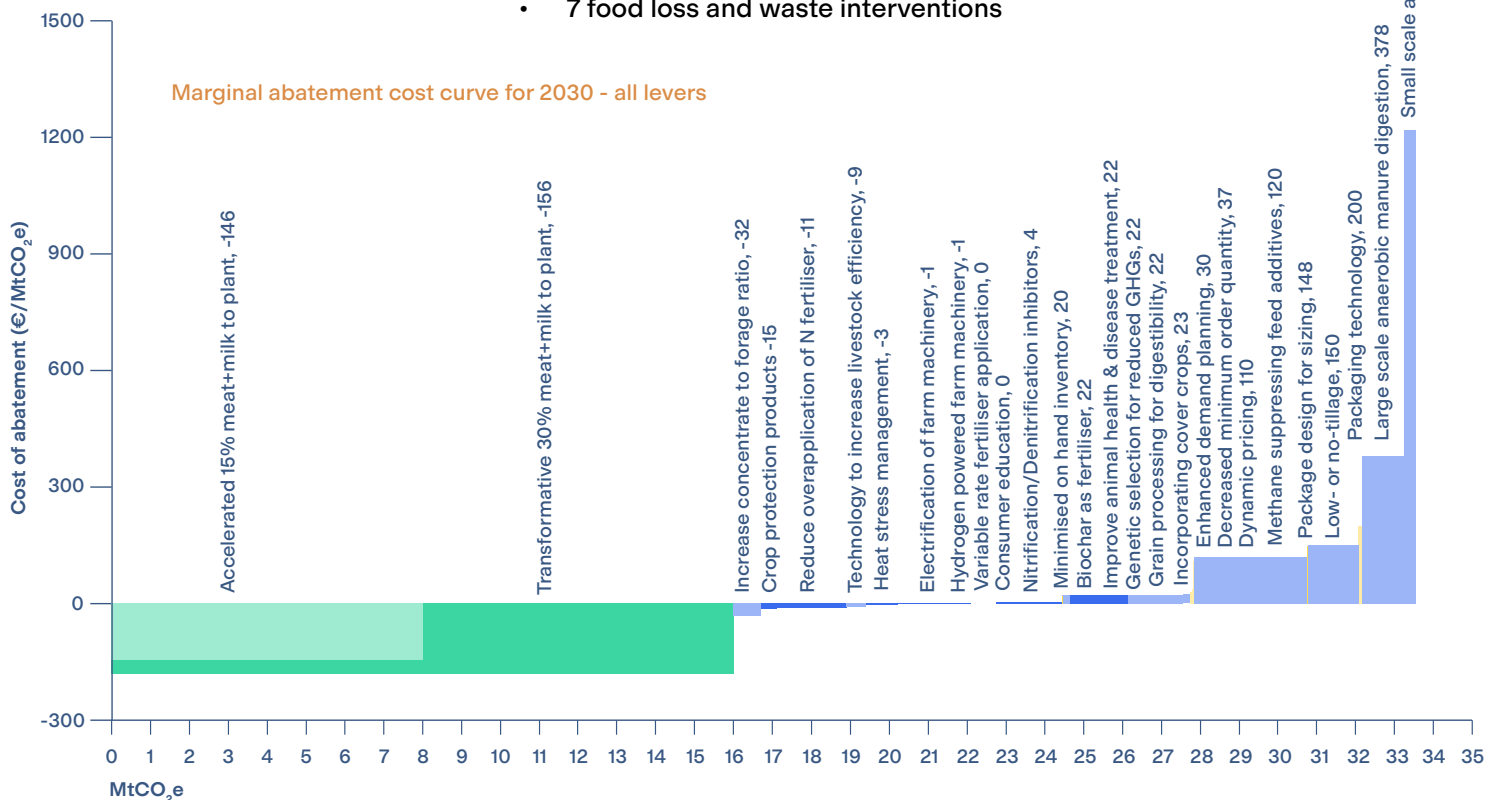
Foundational research for this Briefing

The Report “Biggest Bang for the Buck” and Additional Sector Analysis

1. Biggest Bang for the Buck: Cost-Effective Pathways to Climate Targets in German Food Retail

This new report, co-authored by Madre Brava and Quantis, compares the carbon reduction impact and implementation costs or savings for 27 interventions across three strategies:

- 2 plant-rich food system scenarios
- 18 agricultural interventions
- 7 food loss and waste interventions



- Plant-rich food systems
- Improved agricultural practices
- Reduced food loss and waste
- Intervention is part of the cost-optimum basket
- Intervention is not part of the cost-optimum basket

The precise values per individual intervention can be found in the table in the appendix of this briefing. The precise description of each individual intervention can be found in the [full report](#).

Plant-rich food system scenarios were the most impactful - and the intervention leading to the highest savings overall.

The report looked at two plant-rich food scenarios.

- An Accelerated pathway: Assumes a linear continuation of the historical trend of reduced meat consumption in Germany, with this decline slightly accelerating to a 15% reduction by 2030 and applied to meat and milk.
- A Transformative pathway: Doubles the pace of reduction compared to the Accelerated pathway to an ambitious yet realistic 30% by 2030 from a 2023 baseline.

For both pathways the consumption is fully offset by a 1:1 increase in plant-based alternatives.

The report shows that in both cases, the switch towards a plant-rich food system is the most impactful single intervention in the food retailers' climate playbook - whilst their implementation simultaneously leads to the highest cost savings among all interventions.

The Transformative pathway could slash emissions by a staggering 16 MtCO₂e and save €156 per tCO₂e. This equals a total saving of €2.5 billion.

Besides the immense positive effect on emissions reduction, the report points out that this is also beneficial for human health. The DGE, the [German Nutrition Society](#), advocates for a diet consisting mainly of plants, and advises to consume not more than 15.6kg of animal meat per year. [This ideal consumption level is way below the current German consumption levels of 51.6 kg of meat per capita and year in 2023.](#) The report's transformative scenario with a consumption level of 36 kg therefore serves as a stepping stone towards this ideal.

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Sustainable agriculture could have a big positive impact on emissions – at a price

Food retailers shape what food is produced – and how it is produced. The report shows that supporting farmers to adopt more sustainable agricultural practices is another way to drive down emissions from food retailers' supply chains. It assessed 18 agricultural interventions of livestock and crop production. The potential impact and cost of different interventions varied greatly.

For example, methane-reducing feed additives, the most impactful agricultural intervention with a reduction potential of 2.9 MtCO₂e, comes with a total implementation cost of €345m or €120 per tCO₂e. The agricultural intervention with the highest cost savings is increasing the concentrate to forage ratio in livestock diets, with a potential saving of €32 per tCO₂e. Its climate impact is limited, however, reducing emissions by just 0.7 MtCO₂e.

With all 18 interventions combined, the emissions reduction potential of “Sustainable Agriculture” is 17 MtCO₂e at a cost of €80 per tCO₂e. The total cost is just under €1.4 billion.

Reducing meat and dairy food loss and waste – low cost, low impact

FLW represents a significant environmental, economic, and social challenge. An astonishing [11 million tonnes of food](#) were wasted in Germany in 2021. Still, the report shows limited impact potential.

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Madre Brava combined the interventions to meet the sector target at the lowest cost.”

Overall, consumer education, integrated demand and inventory management promise higher impact in a cost-efficient way, whereas interventions such as new packaging technologies could support at an elevated marginal cost.

When all FLW interventions are combined, the emissions reduction potential is 0.34 MtCO₂e at a cost of €72 per tCO₂e. The total cost is €27.2 million.

2. German Food Retail Sector Analysis – Madre Brava defines a sector reduction target and the cost-optimal basket

The **Biggest Bang for the Buck** provides a clear picture of potential impact on retailers monetary and carbon balance sheets for every individual intervention. To be able to derive a cost optimum basket Madre Brava calculated the basket's volume - that is the Scope 3 FLAG emissions reduction target for the entire sector.

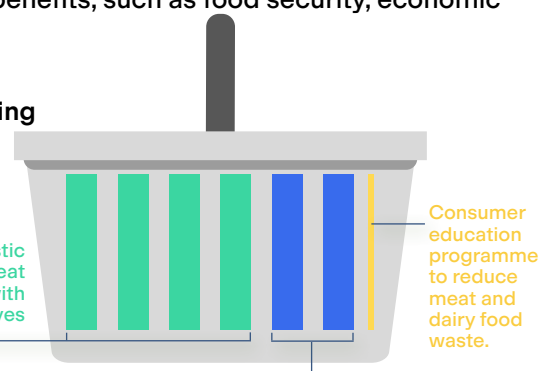
To get there Madre Brava calculated the Scope 3 FLAG emissions for 64% of German food retail, using publicly available data, and scaled this up to an estimate for the whole sector.

The estimated reduction for the German food retail sector to meet the SBTi target of 30.3% reduction by 2030 is 24.12 MtCO₂e – from an estimated 91.11 MtCO₂e of the sector's total Scope 3 FLAG emissions in 2023.

Madre Brava then combined the interventions mentioned to meet this sector target at the lowest cost, while keeping any updated regulations in mind and including other co-benefits, such as food security, economic growth or animal welfare.

The cost-optimum basket meeting the German food retail sector target consists of the following interventions:

Ambitious but realistic pathway of a 30% meat and milk substitution with plant-based alternatives



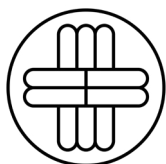
This basket saves emissions of 24.4 MtCO₂e, slightly overdelivering on the target of 24.12 MtCO₂e, whilst simultaneously leading to financial savings of around €2.5 billion.

- Heat stress management in livestock production
- Improved animal health and disease treatment
- Crop protection products
- Nitrification and denitrification inhibitors
- Reducing the overapplication of nitrogen fertiliser
- Variable rate fertiliser application
- Electrification of farm machinery in crop production

Conclusion and Recommendations

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Madre Brava urges major retailers to set a climate transition plan and roll out a protein transition strategy across all brands.”



About Madre Brava

Madre Brava is a global environmental advocacy organisation with a mission to achieve 100% sustainable, healthy, affordable food for all. We work with diverse groups in civil society, government and the food industry to achieve a food system that works for everyone.

<https://madrebrava.org>
nico@madrebrava.org

This research shows that plant-rich diets, particularly the adoption of plant-based proteins over conventional meat and milk, is the most cost-effective strategy for German food retailers to achieve 2030 Scope 3 FLAG emission reduction targets, while simultaneously bringing diets in line with national dietary guidelines and thereby health and nutrition goals.

Madre Brava urges major retailers to set a climate transition plan and roll out a protein transition strategy across all brands. Given the higher impact and lower cost of plant-rich diets, combined with their cost-saving potential, we urge the entire food retail sector in Germany to prioritise the implementation of this measure, which will help comply with the EU's CSRD and meet Scope 3 FLAG targets under the SBTi.

We also strongly recommend that German food retailers set clear protein split targets. This is an essential part of any protein transition strategy, something that the biggest food retailers [in the Netherlands](#) have realised and raced ahead with.

The food retail sector should also support consumers to adopt plant-rich diets through enabling measures such as **price parity, promotions and placement of alternative products next to animal products.** [Real-world data shows](#) that lowering the price of plant-based products to match those of conventional meat and dairy products and displaying them next to each other increases sales of plant proteins and helps accelerate the protein transition.



Improvement of agricultural practices holds long-term emissions-reduction potential but requires substantial investment and offers limited short-term impact. **For fast adoption of effective measures, food retailers must support farmers financially and clearly commit to specific interventions.** By doing so, they will not only align with global climate goals but also enhance the resilience and competitiveness of the agrifood system in Germany.

Food retail must also drive further improvements in the reduction of food loss and waste by fostering supply chain innovation, educating consumers, and integrating efficient inventory management.

Appendix

Table 1. Cost and contribution of carbon emissions reduction measures in our [Biggest Bang for the Buck report](#) to the reduction needed by the German food retail sector to meet the SBTi target of 30.3% (24.12 MtCO₂e) reduction in FLAG emissions by 2030

Category of Intervention	Intervention	Cost or saving (€) per tCO ₂ e (low to high)	Emissions reduction potential (MtCO ₂ e)	Contribution to the 24.12 reduction needed (%)	Total cost or saving (million €)	
Plant-rich food systems	Interventions Aggregated by Strategy	-156	16	66,3	-2437	
	Transformative 30% meat+milk to plant	-156	16	66,3	-2437	
	Accelerated 15% meat+milk to plant	-146	8	33,2	-1141	
	Increase concentrate to forage ratio	-32	0,7	2,9	-22	
	Crop protection products	-15	0,4	1,7	-6	
	Reduce overapplication of N fertiliser	-11	1,8	7,5	-20	
	Technology to increase livestock efficiency	-9	0,5	2,1	-5	
	Heat stress management	-3	0,8	3,3	-2.3	
	Electrification of farm machinery	-1	1,5	6,2	-1.5	
	Hydrogen powered farm machinery	-1	0,4	1,7	-0.4	
	Variable rate fertiliser application	0	0,5	2,1	0	
	Consumer education	0	0,142	0,6	0	
	Nitrification/Denitrification inhibitors	4	1,7	7,0	7	
	Minimised on hand inventory	20	0,004	0,0	0,1	
	Biochar as fertiliser	22	0,2	0,8	3	
	Grain processing for digestibility	22	0,3	1,2	8	
	Genetic selection for reduced GHGs	22	1,1	4,6	25	
	Improve animal health & disease treatment	22	1,5	6,2	34	
	Incorporating cover crops	23	0,2	0,8	5	
	Enhanced demand planning	30	0,039	0,2	1,2	
Decreased minimum order quantity	37	0,022	0,1	0,8		
Food loss and waste	Interventions Aggregated by Strategy	72	0,35	1,5	25	
	Sustainable agriculture	Interventions Aggregated by Strategy	80	17	70.5	1397
		Dynamic pricing	110	0,043	0,2	4,8
		Methane suppressing feed additives	120	2,9	12,0	345
		Package design for sizing	148	0,017	0,1	2,5
		Low- or no-tillage	150	1,3	5,4	200
		Packaging technology	200	0,079	0,3	15,7
		Large scale anaerobic manure digestion	378	1,1	4,6	423
		Small scale anaerobic manure digestion	1217	0,3	1,2	426

 Intervention is part of the cost-optimum basket
 Intervention is not part of the cost-optimum basket