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Environmental Food Production Dashboard

Assessing Sustainability Through Data-Driven Insights

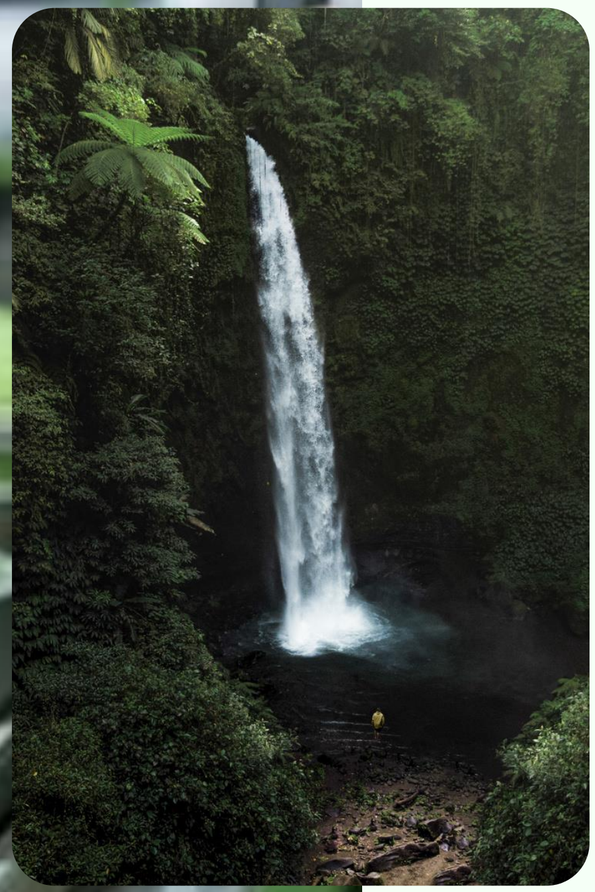
START SLIDE

INTRODUCTION

Food production plays a critical role in shaping global sustainability outcomes. While essential for human survival, it is also one of the largest contributors to environmental challenges, including greenhouse gas emissions, land degradation, freshwater scarcity, and eutrophication. This project evaluates the footprints of 43 food products across 12 food groups, focusing on CO_2 emissions, land use, water scarcity, and eutrophication.

OBJECTIVES

- Evaluate the environmental impacts of food production across CO_2, land use, water use, and eutrophication
- Identify hotspots in food groups and production stages
- Provide actionable insights for policymakers, producers, and consumers
- Document methodology and deliverables via GitHub repository
- Support sustainable food system decision-making



TOOLS USED

- **Power BI**: Dashboard creation and analysis
- **Power Query & DAX**: Data cleaning and measures
- **GitHub**: Repository for documentation and code
- **Excel**: Preliminary dataset exploration

CRISP-DM Framework

BUSINESS AND DATA UNDERSTANDING

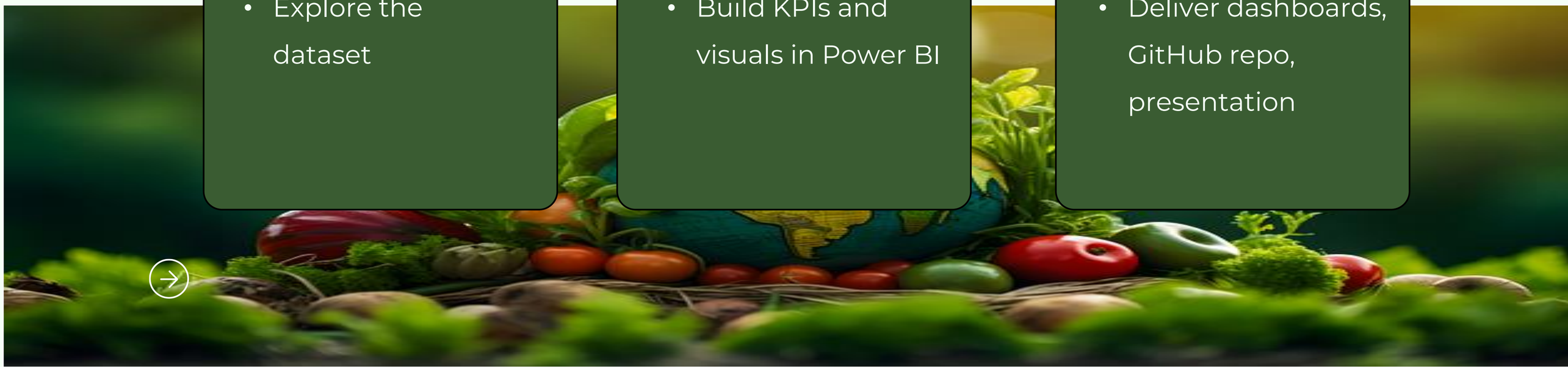
- Define problem & questions
- Explore the dataset

DATA PREPARATION AND MODELLING

- Clean and model data
- Build KPIs and visuals in Power BI

EVALUATION AND DEPLOYMENT

- Validate insights (hotspots, trade-offs)
- Deliver dashboards, GitHub repo, presentation



BUSINESS & ANALYTICAL QUESTIONS

- Which food groups generate the highest CO_2 emissions per kg?
- What are the water-scarcity hotspots across food groups?
- How does land use vary by product category?
- Which lifecycle stages contribute most to emissions?
- Which foods have multi-dimensional sustainability trade-offs?

KPI INSIGHTS

- Meat and stimulants dominate CO_2 intensity.
- Most foods fall under High/Very High emission intensity

Total Emissions

- 256.8 CO_2e/kg across 43 food products

Average CO_2 per kg

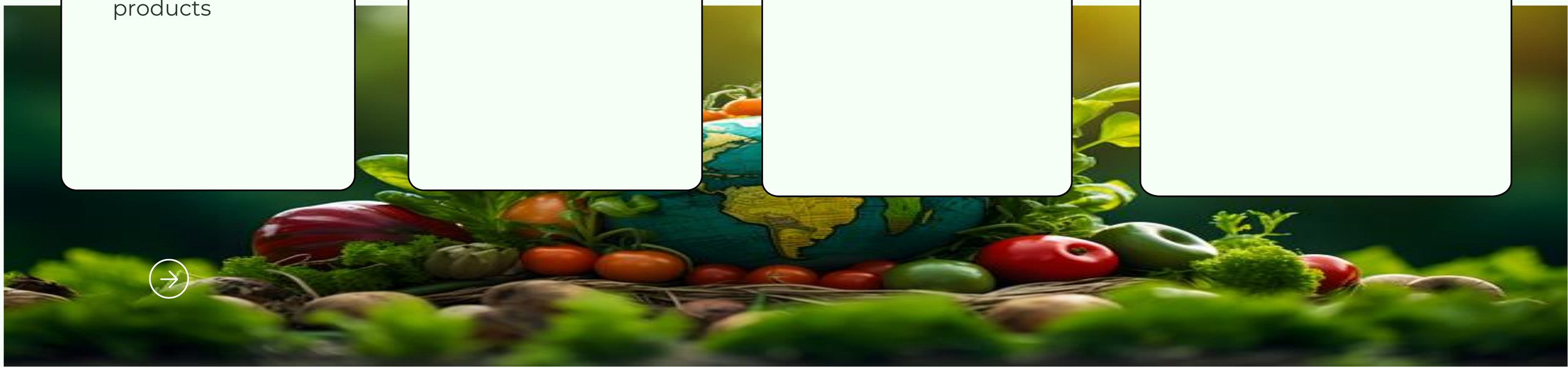
- 6.0 CO_2e/kg

Average land use per kg

- 29.3 CO_2e/kg

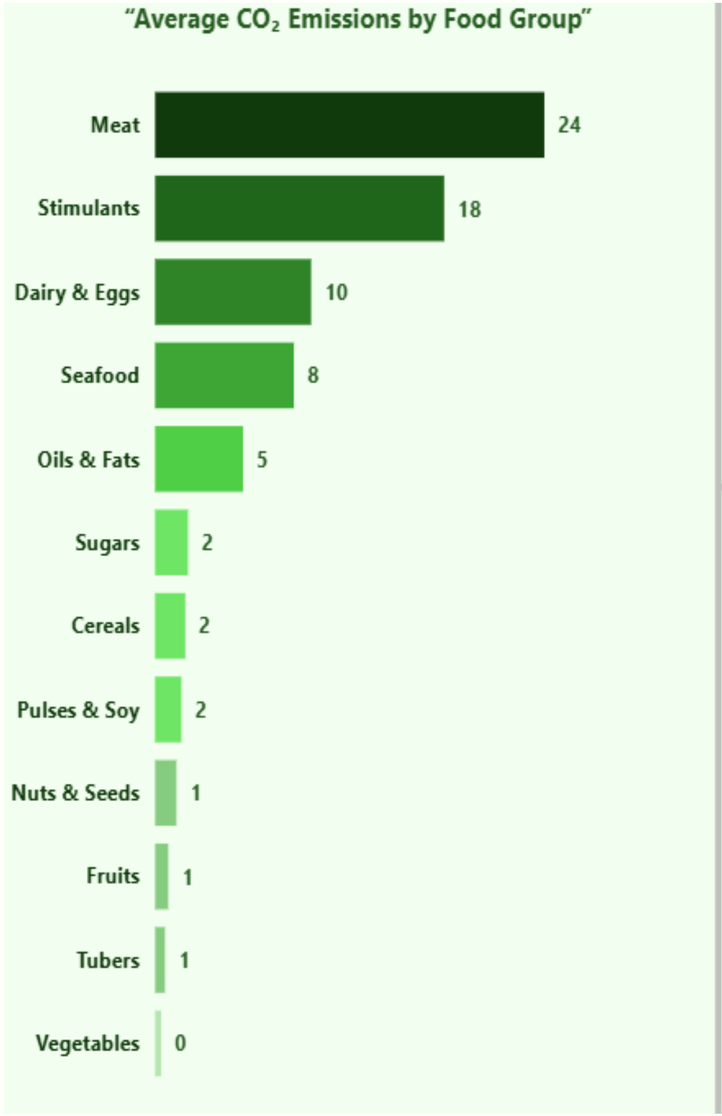
Average water scarcity per kg

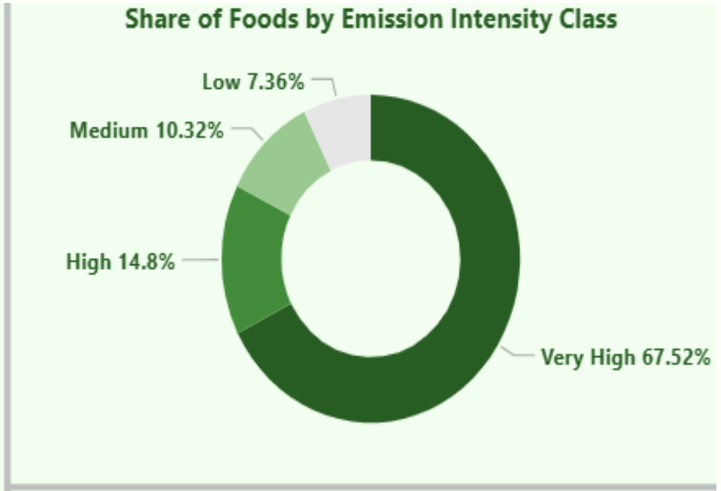
- 36.6K

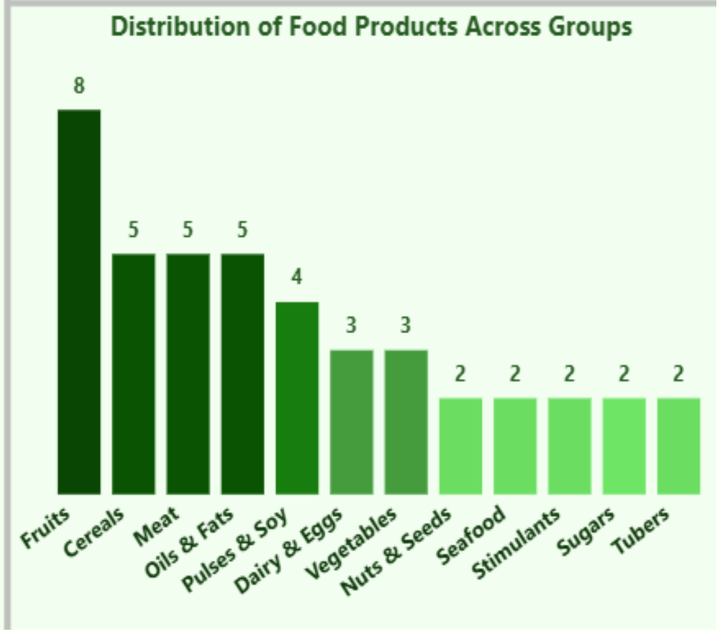


OVERVIEW OF INSIGHTS

- Food Group Leaders: Meat (24) and stimulants (18, e.g., coffee, cocoa) are the biggest emitters.
- Vegetables and tubers contribute almost negligible emissions.
- Emission Intensity Classes: Very High impact foods dominate (67.5%), with high (14.8%) and medium (10.3%) following. Only a small share is low impact

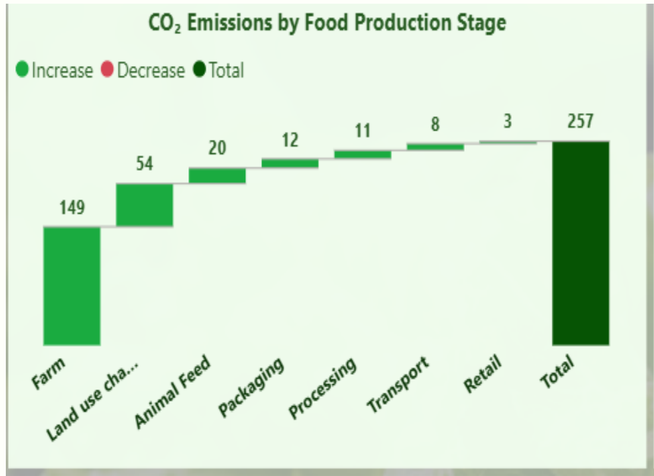


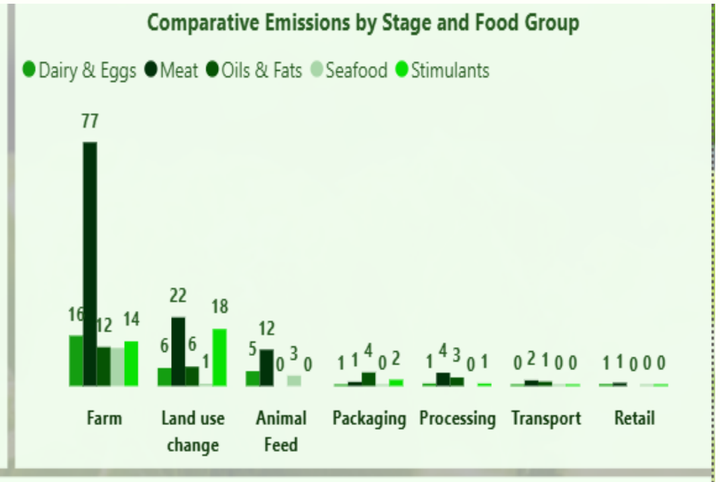




LIFECYCLE STAGE ANALYSIS

- **Stage Contribution**: Farming dominates with 149 kg CO_2e, making it the single largest contributor.
- **Comparative Analysis**: Meat and dairy are the largest contributors in farm and animal feed stages.
- **Stage-Level Table**: Shows that meat emissions come from multiple stages, with farm (77) and animal feed (11.5) being critical hotspots.



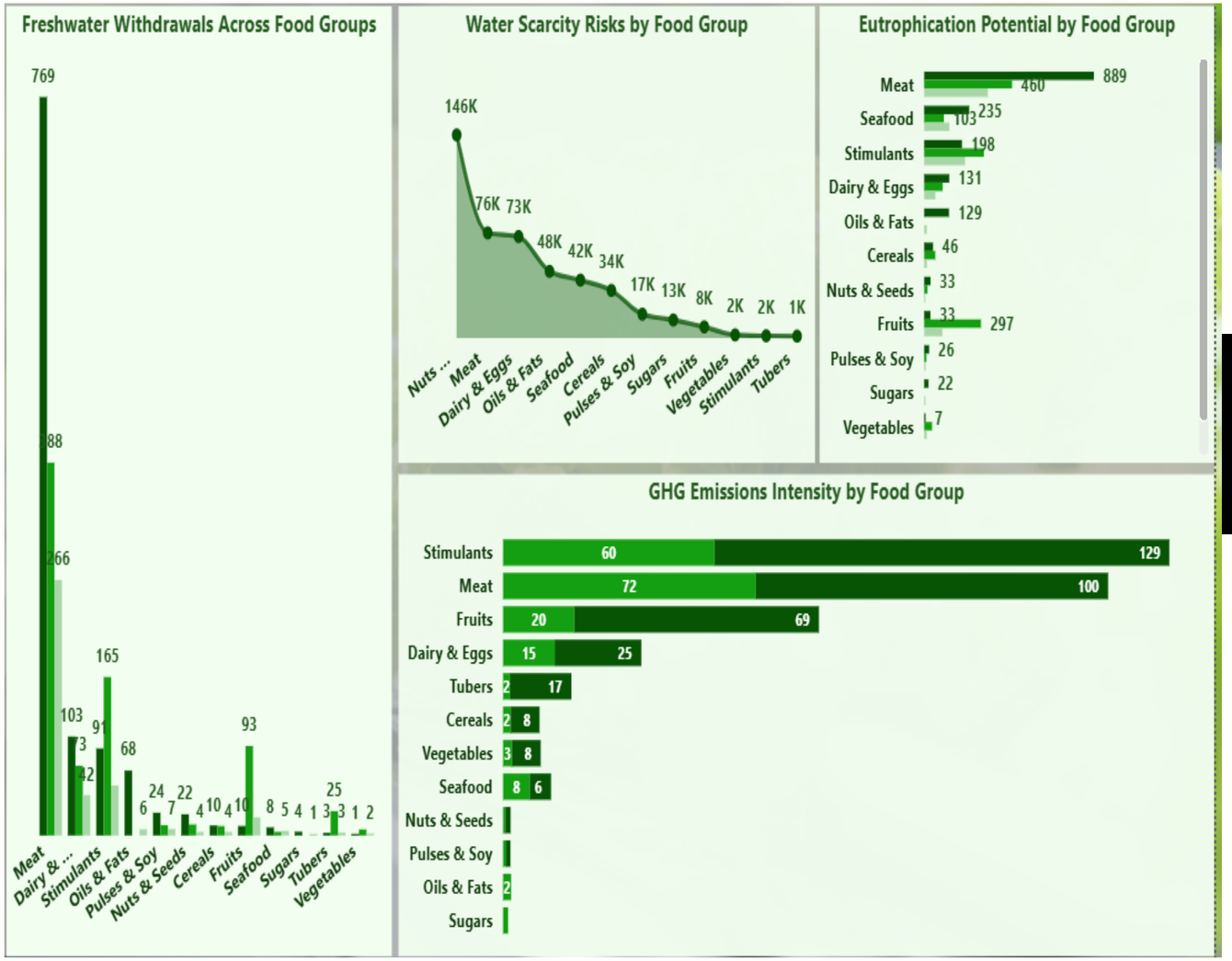


Stage-Level Emission Contributions

Stage	Animal Feed		Farm		Land use change		Packa
Food Group	Sum of CO2e_kg_per_kg	Overall_Total_Emissions	Sum of CO2e_kg_per_kg	Overall_Total_Emissions	Sum of CO2e_kg_per_kg	Overall_Total_Emissions	Sum
Total	**19.50**	**256.80**	**149.20**	**256.80**	**54.20**	**256.80**	
Cereals	0.00	9.20	6.50	9.20	0.40	9.20	
Dairy & Eggs	4.70	28.50	15.90	28.50	5.70	28.50	
Fruits	0.00	6.40	3.50	6.40	0.30	6.40	
Meat	11.50	118.50	77.00	118.50	21.70	118.50	
Nuts & Seeds	0.00	2.60	3.50	2.60	-1.70	2.60	
Oils & Fats	0.00	26.80	12.30	26.80	6.10	26.80	
Pulses & Soy	0.00	6.40	2.40	6.40	1.20	6.40	
Seafood	3.30	16.90	12.00	16.90	0.70	16.90	

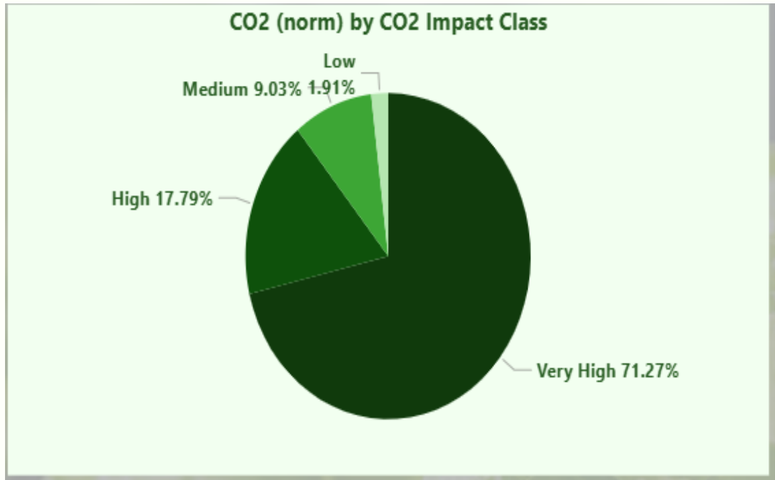
ENVIRONMENTAL FOOTPRINTS

- Meat (769) and dairy/eggs (266) are the most water-intensive.
- Nuts (146K litres) and meat (76K) dominate, suggesting high geographic stress in production regions.
- Meat (400) and seafood (255) drive nutrient pollution (e.g., runoff into rivers).
- Stimulants (129) and meat (72) stand out again, showing strong carbon and methane contributions.



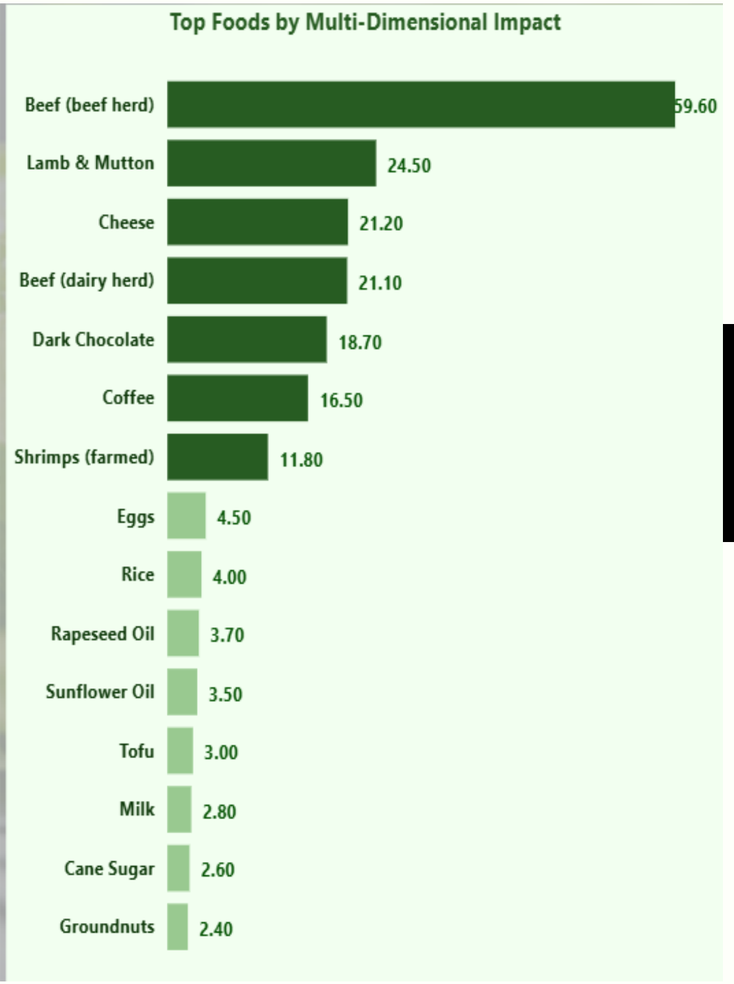
TRADE-OFFS & HOTSPOTS

- High CO_2 intensity foods also require high land and water
- Beef, lamb, and chocolate emerge as top hotspots
- Pulses and vegetables offer lower trade-offs
- Bar charts show relative sustainability
- Animal-based foods dominate the hotspots, with beef standing out as the single largest contributor across all dimensions.



Sustainability Metrics Across Food Groups

Food Group	Land per kg	Scarcity-weighted water per kg	Total_GHG_Emissions
Total	**29.26**	**36,607.43**	**185.92**
Nuts & Seeds	11.04	145,843.85	0.63
Meat	153.77	75,501.60	71.65
Dairy & Eggs	34.34	72,873.20	14.66
Oils & Fats	13.51	47,873.54	2.27
Seafood	8.41	41,572.20	7.61
Cereals	5.20	34,181.25	2.15
Pulses & Soy	7.90	17,127.07	0.81
Sugars	1.94	12,965.95	1.43
Fruits	1.23	7,988.56	20.23



FINAL DELIVERABLES

- GitHub Repository: README, scripts, documentation, dashboards
- Power BI Visualisation File
- Presentation (this deck)
- Documentation with CRISP-DM process and results

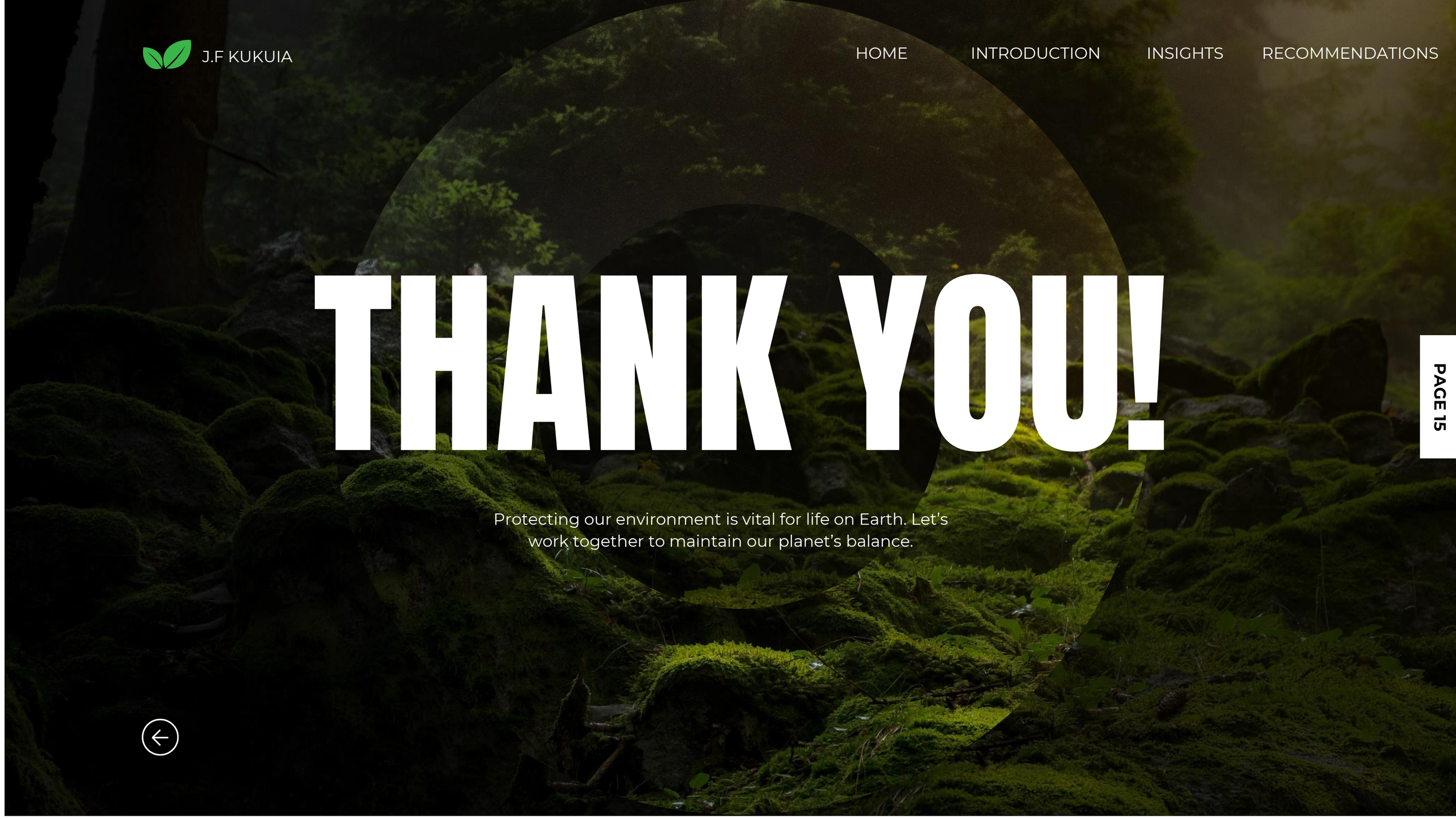
RECOMMENDATIONS

- Policymakers: Promote low-impact food production
- Producers: Optimise farming practices and land use
- Consumers: Shift diets to lower-impact foods
- Future Work: Expand dataset to cover regional variation

CONCLUSION

- Environmental footprints vary widely by food group and lifecycle stage.

  Livestock and stimulants carry the greatest burdens across CO_2, water, and eutrophication.
- Farming stages and animal feed are the most emission-intensive lifecycle points.
- Plant-based foods generally show lower impact, but nuts are an exception due to water intensity.
- Beef (especially beef herd) is the top global hotspot, making it the key target for sustainability interventions.



THANK YOU!

Protecting our environment is vital for life on Earth. Let’s work together to maintain our planet’s balance.